The ACE Grain Flow Model: Results and Discussion

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To the Navigation Economic Technologies (NETS) Grain Forecast Modeling and Scenarios Workshop,

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Paper/reports are as follow

- Available at WWW/nets
  - *Longer-Term Forecasting of Commodity Flows on the Mississippi River: Application to Grains and World Trade*
  - Appendix titled *Longer-Term Forecasting of Commodity Flows on the Mississippi River: Application to Grains and World Trade: Appendix*
  - *IWR Report 006-NETS-R-12*
- http://www.nets.iwr.usace.army.mil/docs/LongTermForecastCommodity/06-NETS-R-12.pdf
- NDSU Research Reports forthcoming

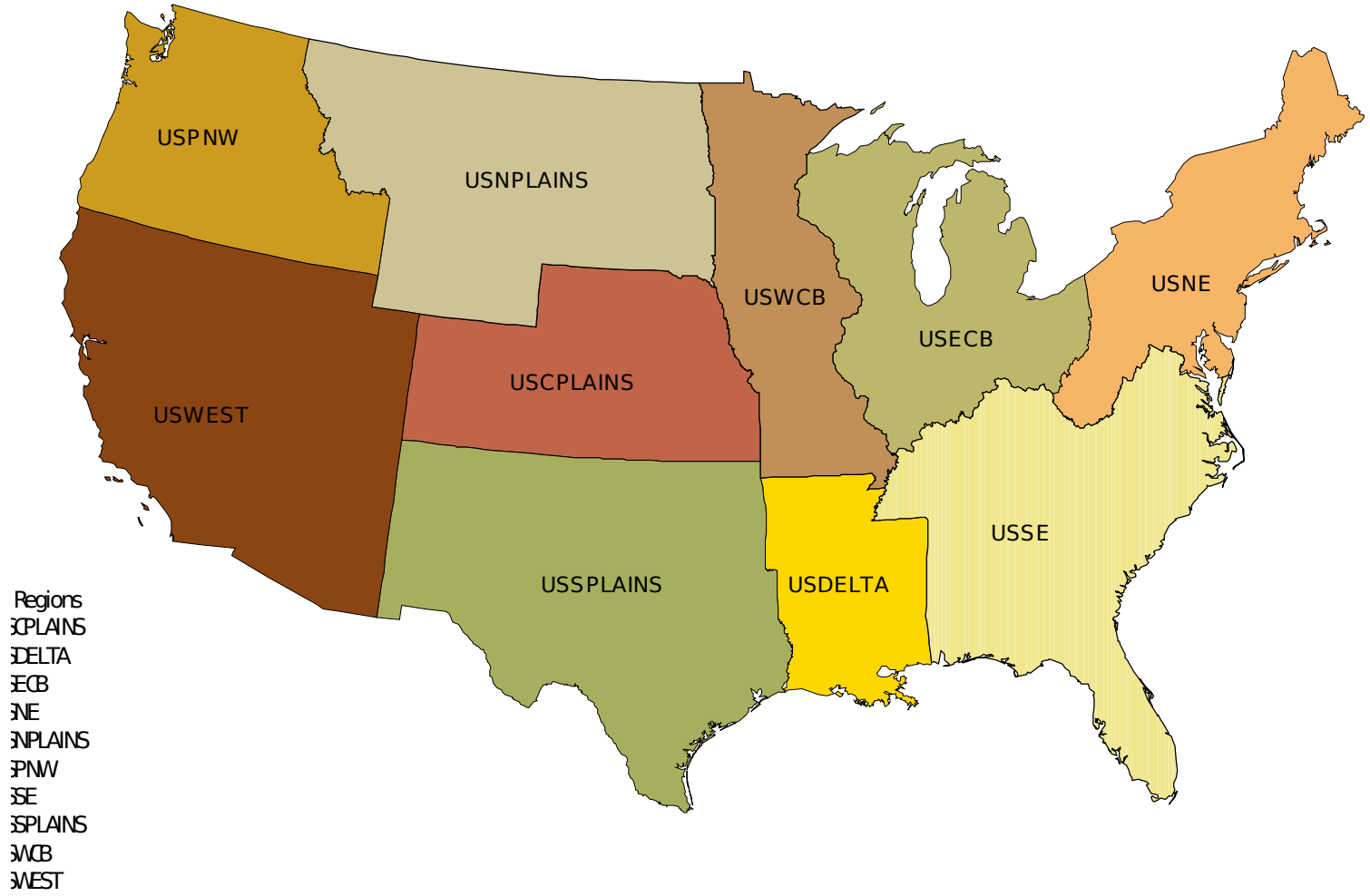
Outline of Topics

- **Calibration**
  - **Logic of additional restrictions**
  - **Calibration**
  - **Projection methodology**
- **BASE CASE** Results
- Projections
- Delay costs
- Sensitivities
- Summary
- Model and methodology details in separate ppt.

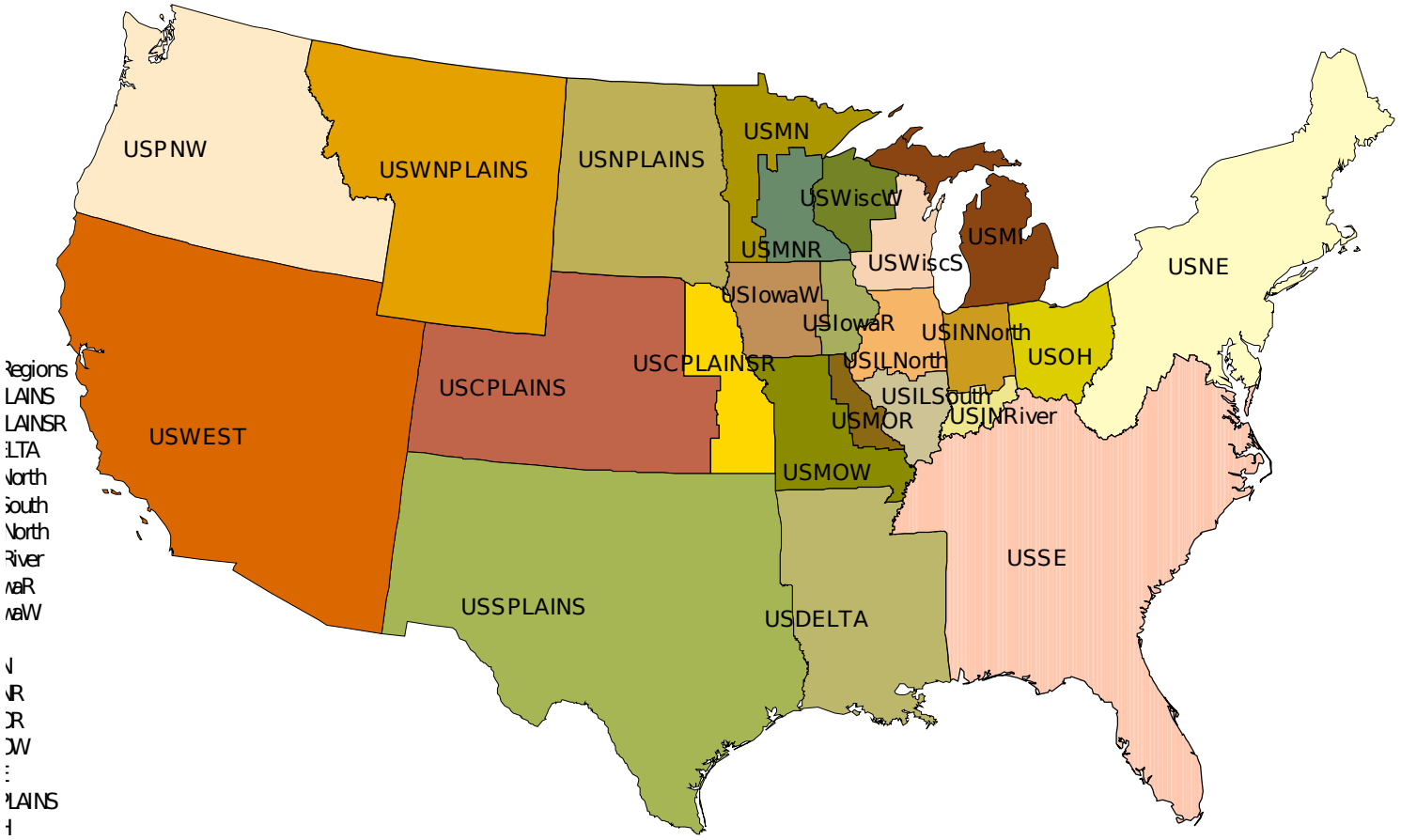
Model Dimensions and Scope

- Below are the major components of the model:
  - Consumption and import demand:
    - Estimates of consumption were generated based on incomes, population and the change in income elasticity as countries mature. For the United States, ethanol demand for corn was treated separately from other sources of demand.
  - Export supply: For each exporting country and region, export supply is defined as the residual of production and consumption.
  - Costs Included:
    - Production costs
    - Shipping by truck, rail, barge and ocean
    - Barge delay costs (nonlinear)
    - Handling costs
    - Import tariffs, export subsidies and trade restrictions
  - Regions: The model comprises producing and consuming regions. See maps attached
- Model dimensions: The model was defined in GAMS and has 21,301 variables and 761 restrictions.

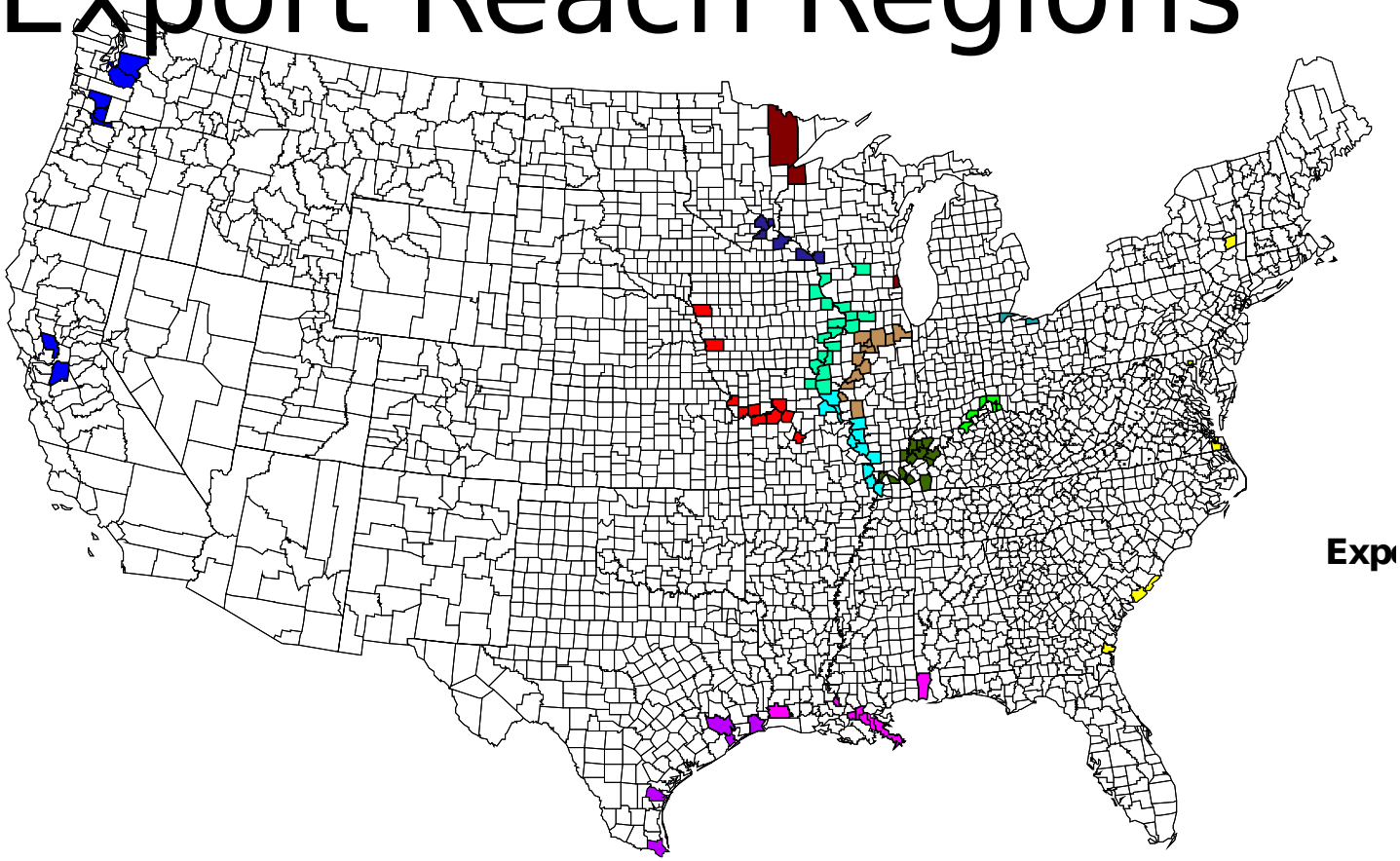
US Consumption Regions



US Production Regions



Export Reach Regions



Projection Methodology

- Demand is projected for each country and region based on income and population projections from Global Insights;
- Yield and production costs for each producing region are derived;
- Production potential is determined in each country/region subject to the area restriction;
- US modal rates were derived and it was assumed that their spatial relationship was the same during the projection period.
- Ocean shipping costs were projected
- Model was solved for each year in the projection horizon which was defined in 10 year increments for 50 years.

Table 6.1.1 Base Case Assumptions

Model Assumption	Base Period 2000-2004	Projection Period	Sensitivities during projection period
Barge system capacity	141 mmt for grain origination	Existing and expanded capacity	
Non-Grain Barge	2000-2004 average levels	Assumed same as base case	
US rail car capacity	Restricted rail capacity		Restriction expanded
Modal rates	Rail from 2000-2004 average; barge rates represented as rate functions by Reach; ocean rates derived from a regression	Assumed same as base case	

US area restrictions	3 restrictions imposed:
	minimum total area=100% of recent 3 year average;
	maximum total area=100% of base;
	maximum area that can be switched among crops was 7% from the base period.
		Maximum changed to 107% in 2010 forward	Relaxed to allow expanded production as required

Rest of World (ROW) area restrictions	3 restrictions imposed: minimum total area=100% of recent 3 year average; and minimum area for any one crop=88% of base; maximum total area=107% of base; maximum area that can be switched among crops was 7% from the base period.	Maximum changed to 107% in 2010 107% in 2020 115% in 2030 115% in 2040 121% in 2060	Relaxed to allow expanded production as required
Ethanol production	EIA 2005 projections	EIA 2005 projections	EIA 2006 Projections and 7.5 billion gallons
China corn trade	Exports subsidized to 8 mmt	China exports=0	Relaxed restrictions on China imports and exports
Other Trade policies	Retained as in Appendix Table 2.1	Retained	

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	maximum area that can be switched among crops was 12% from the base period.
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Other restrictions: Wheat

- Due to a cumulation of peculiarities on wheat trade and marketing, mostly due to cost differentials and quality demands, we imposed a set of restrictions.
- These were intended to ensure that countries trade patterns were represented, and to allow some inter-port area shifts in flows within North America.
- Restrictions applied for a group of countries include:
  - X% of their imports must originate from the HRS producing Regions of North America;
  - Y% of their imports must originate from the SWH producing regions of North America; and
  - Max Z % of their imports could originate from Canada.
  - Values for X, Y and Z were derived from actual shipments for the period 1995-2004

Calibration

- Model only solves in years where S>D
  - About 2 of 5 years (i.e.., we are drawing down stocks)
  - Due to treatment of stocks (no stockholding)
  - Precluded backcasting (an econometric concept)
- Resolve: Calibration to
  - average of values of base period: 2000-2004
  - Actual barge flows
  - Exports by port
  - Exports/imports by country using data from
    - IGC, FGIS and others

Additional Assumptions
To Calibrate to Base Period

- PNW Rail Rates for Corn and Soybeans from MN and NP to PNW adjusted - $2/MT
- Mexico rail shipments
  - limited corn + soy to 5 MMT
- Restricted selected domestic consumption movements
  - This is due to low STB rates for very minimal (near zero) actual rail shipment volumes.
  - These include (summarized below)
    - Corn:
      - IAR, MN, MNR, NP to SE;
      - IAW, MN, MNR MOR, MOW to NE;
      - OH to ECB;
      - MN to CP;
    - Soybeans: NP to SE;
    - Wheat: CP to NE
  - hard wheat shipments to river to reflect Shuttle Rates.
- Shipments to East Coast
  - About 1 mmt/yr.
  - No restriction imposed

Table 2.2 Changes to Model Specifications to Calibrate Domestic Flows

Region	Change	Effect
Wheat from western regions (NP, MN, MNR, MOW, MOR, CP, CPR, IAR, IAW)	Restricted export wheat shipments from Western origins to be by direct rail	Increases direct rail shipments of wheat to Gulf/PNW and increases barge flows of corn
Corn shipments from Iowa River, Minnesota, Minnesota River and Northern Plains to the Southeast	Restrict domestic rail/truck flows to nil	Increases flows available for the river and/or for the PNW export markets
Corn shipment from Iowa west, Minnesota, Minnesota River, Missouri River and Missouri West to the Northeast	Restrict domestic rail/truck flows to nil	Increases flows available for the river and/or for the PNW export markets
Corn from Minnesota to the Central Plains	Restrict domestic rail flows to nil	Increases flows available for the river and/or for the PNW export markets
Soybeans from the Northern Plains to the Southeast	Restrict domestic rail flows to nil	Increases flows available for the river and/or for the PNW export markets
All grain shipments from Ohio to Eastern Corn Belt	Restrict domestic truck/rail flows to nil	Forces Ohio to ship to NE, SE (normal flows) adds wheat from OH to barge system.

Calibration

- *World trade*:
  - Comparing model results to actual exports suggests these are very similar.
- *US Port shipments* Results are very comparable to actual shipments.
  - Export volumes from the US are comparable by grain type as are interport exports.
  - Exception is East Coast exports which should be slightly greater than generated from the model

Calibration of Exports

Historical U.S. Export Shipments (2000-2004)

	Total	Corn	Soybeans	Wheat
East Coast/Lakes	5,960	1,507	2,049	2,405
Gulf	67,774	33,952	19,908	13,915
PNW	20,663	6,521	3,749	10,393
Internal	4,426	1,878	1,991	557
Total	98,823	43,858	27,696	27,269

Base Case - Current Capacity

	Total	Corn	Soybeans	Wheat
East Coast/Lakes	2,554	0	0	2,554
Gulf	65,215	32,767	19,924	12,524
PNW	24,594	9,923	6,101	8,570
Internal	8,234	1,005	3,995	3,234
Total	100,597	43,695	30,020	26,882

Comparison of Actual and Projected Barge Loadings by Re

Reach	Average 2000-2004	Base Case	Difference
	(000 MT)	(000 MT)	(000 MT)
Reach 1	7,909	7,154	-755
Reach 2	10,626	3,781	-6,845
Reach 3	7,450	12,235	4,785
Reach 4	14,608	21,771	7,163
Reach 5	4,169	4,184	15
Reach 6	2,317	2,050	-267
Total	47,079	51,175	4,096

Calibration: *Reach Shipments*:

- Reach shipments:
  - Actual were 47 mmt, and varied from 43 to 51 mmt with sharp declines commencing from 2002.
  - Model results compare favorably with a total of 51 mmt.
  - Concentrated with about 15 mmt soybeans, 33 mmt corn and 3 mmt wheat.
- Generally comparable when aggregating across reaches, as well as within reaches.
- Important differences are that the model
  - overestimates the amount being shipped through Reaches 3-4
  - underestimates that being shipped on Reach 2.
  - Upon closer experimentation, there are very close interrelationships among shipments from Illinois and Iowa to Reach 2 and Reach 4, as well as to shipments in the Western Corn Belt and the South East for domestic shipments.

Comparison of Actual vs. Projected by Grain

Reach	Total	Corn	Soybeans	Wheat
Avg 2000-2004	(000 MT)	(000 MT)	(000 MT)	(000 MT)
Reach 1	7,909	4,144	2,227	1,538
Reach 2	10,626	7,483	3,007	136
Reach 3	7,450	5,384	1,680	386
Reach 4	14,608	10,853	3,557	199
Reach 5	4,169	2,758	982	430
Reach 6	2,317	1,214	985	118
Total	47,079	31,836	12,438	2,807
Base Case	(000 MT)	(000 MT)	(000 MT)	(000 MT)
Reach 1	7,154	2,834	2,556	1,764
Reach 2	3,781	3,781	0	0
Reach 3	12,235	8,657	3,578	0
Reach 4	21,771	14,463	6,945	364
Reach 5	4,184	2,625	1,283	276
Reach 6	2,050	408	804	838
Total	51,175	32,767	15,166	3,242

Approaches to Reconcile Reach 4 and 3 Shipments

- Upon further examination
  - the model has about 12 mmt from Minn. River to Reach3.
  - This exceeds observed volumes of 7.5 mmt.
  - We were unable to reconcile this difference. There is sufficient supplies and demand
  - Alternatives:
    - Adjust truck distances
    - Forcing shipments
- To rationalize this shipment, and historically, shipments occur on this node which are all corn and soybeans, by truck to Reach 3.
- The only way to reduce this within the model would be to
  - increase truck rates (see below),
  - or increase barge rates. We did neither.
- To explore , we adjusted truck rates to Reach 2, 3, and 4 to better capture the observed inter-reach allocation.
  - Truck rates to each Reach would have to change as follows:
  - Reach 2 -3$/mt;
  - Reach 3 +$6/mt; and
  - Reach 4 +$5/mt.
- None adopted
  - Simply too restrictive

US East Coast Exports

- US exports via the East are only wheat
  - Mostly from the Lakes, though some is from the Atlantic.
  - nil exports of corn and soybeans from this node.
    - This contrasts with actual flows where corn and soybeans comprise about 2-3 mmt, most of which goes to Europe or North Africa.
    - Exports from these regions have been declining for a number of years.

Domestic Flows

- Movements generally coincide with expectations.
  - To the Reaches and Ports
  - To domestic consumption points

Domestic Rail Flows

- Notable shipments.
  - Much of Illinois North is shipped to Reach 4
    - though relative rates favor rail direct to NOLA
    - If there is adequate rail capacity, this is the optimal shipment which displaces barges.
- Iowa River ships to Reach 2
  - And to the Western Corn Belt
  - Expected and verified in the STB data.
- Inspection of the STB data on volume it is apparent that
  - shipment from Iowa River to the Western corn belt are not nil.
    - Rail shipments for this flow have increased from near nil in 2000 to 443,296 mt in 2004.
  - volume from Iowa West to the Western Corn Belt from 2000 to 2004 has been decreasing over time (1.6 mmt to 0.7 mmt).

- Major point
  - Cannot assume that river-adjacent locations ship all to River
  - Growth in volume to non-River destinations

Shipments from Production Regions to Reaches

Production Region	Export Region RCH1	RCH2	RCH3	RCH4	RCH5	RCH6	Toledo TOL	Duluth USD	LA Gulf USNO	PNW USNW	Texas Gulf UST
USCP							407				4,900
USCPR									2,447		
USD									863		1,046
USIAR		3,781									
USILN				21,771							
USILS	1,571										
USINR					4,184						
USMN										2,656	
USMNR			12,235								
USMOR	3,505										
USMOW	1,321										340
USNP								2,147		14,328	138
USOH	758					2,050			1,448		
USPNW										1,798	2,858
USSP										1,608	
USWNP										4,204	

Shipments from Production Regions to Consumption Regions

Production Region	Direct to MEXC	Consumption Region USCPC	USDC	USECBC	USNEC	USNPC	USPNWC	USSEC	USSPC	USWC	USWCBC
USCP		31,186						1,175			
USCPR		7,175	6,277				3,165			4,927	2,622
USD			8,297								
USIAR											13,428
USIAW											43,781
USILN				14,255				702			
USILS				5,125				15,583			
USINN				22,565							
USINR				1,423							
USMI				9,082							
USMN	4,596								3,832	3,593	1,790
USMNR											6,785
USMOR											234
USMOW				2,466					7,511		696
USNE				615	7,722						
USNP	2,030			2,662		10,229					
USOH					4,576			8,544			
USPNW							2,151			2,000	
USSE								18,515			
USSP	1,608								10,696		
USW										2,188	
USWIS				7,488							356
USWIW				3,006							15
USWNP						215					

Results

- Base case projections
- Expansion base case projections
- High ethanol
  - With/wo China
- Sensitivities

Base case Max Area Assumptions

In order to produce adequate supplies to meet demand, and with the U.S. maximum area fixed at 107%, the area devoted to these crops in row would have to increase by these values.

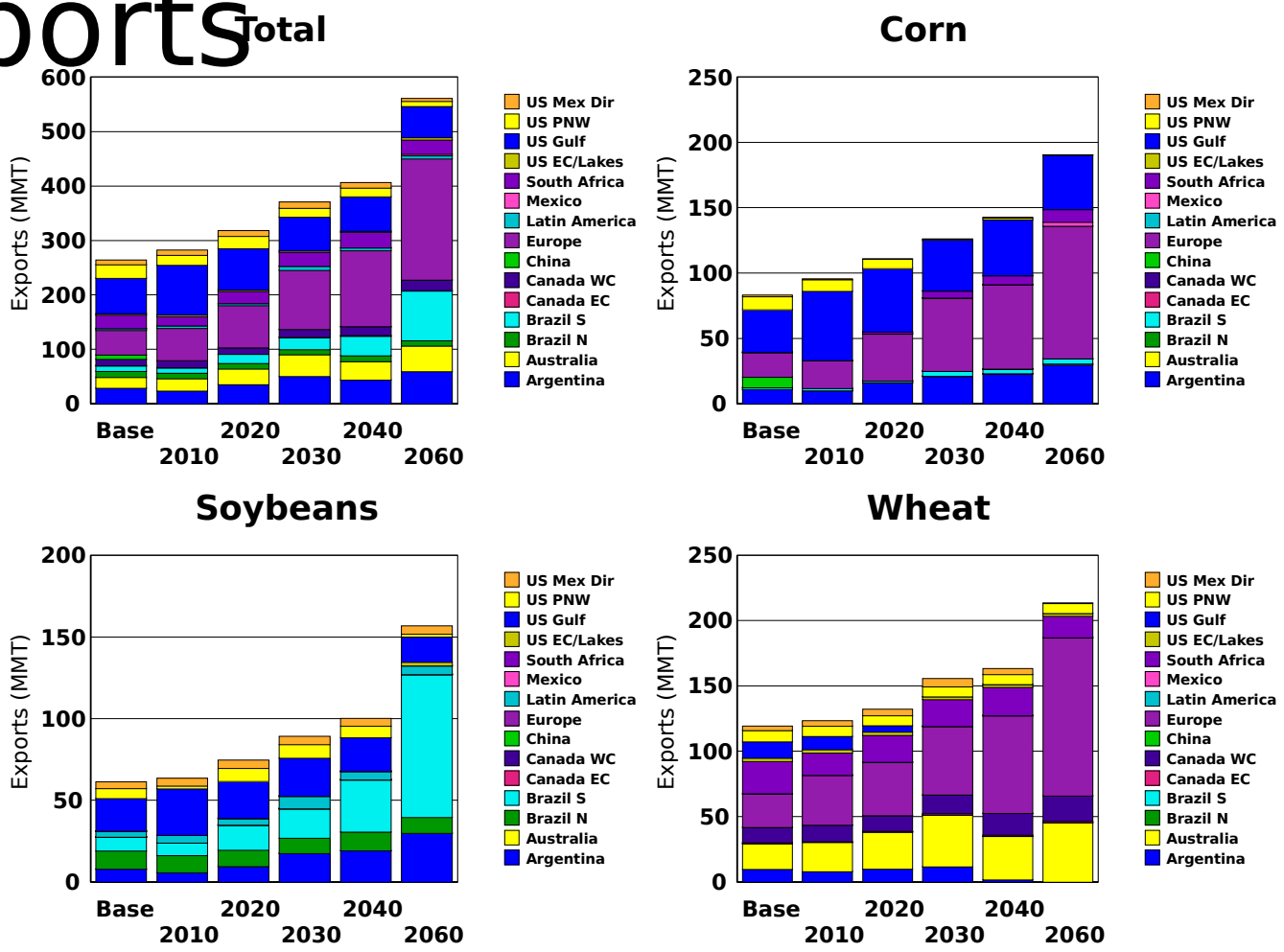
Approximately equal 2007 CRP land available in CRP Rationalization:.

- -Other crops
- -CRP
- -Shortage if not implemented

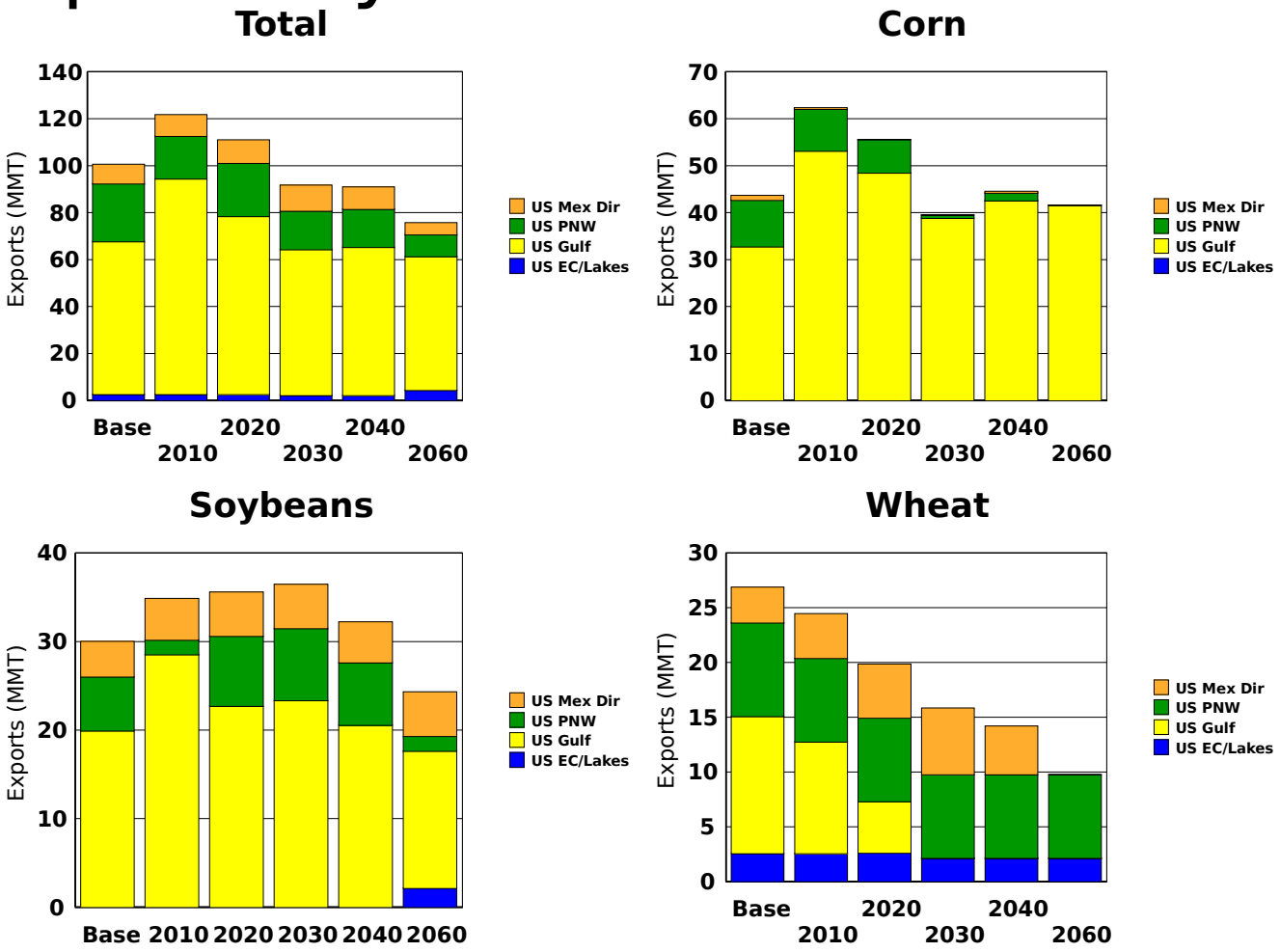
Maximum Area Limit Relative to Projected Base Area to Achieve a Solution (%)

	Base	*2010*	*2020*	*2030*	*2040*	*2060*
US	100	107	107	107	107	107
ROW	107	106	107	119	115	123

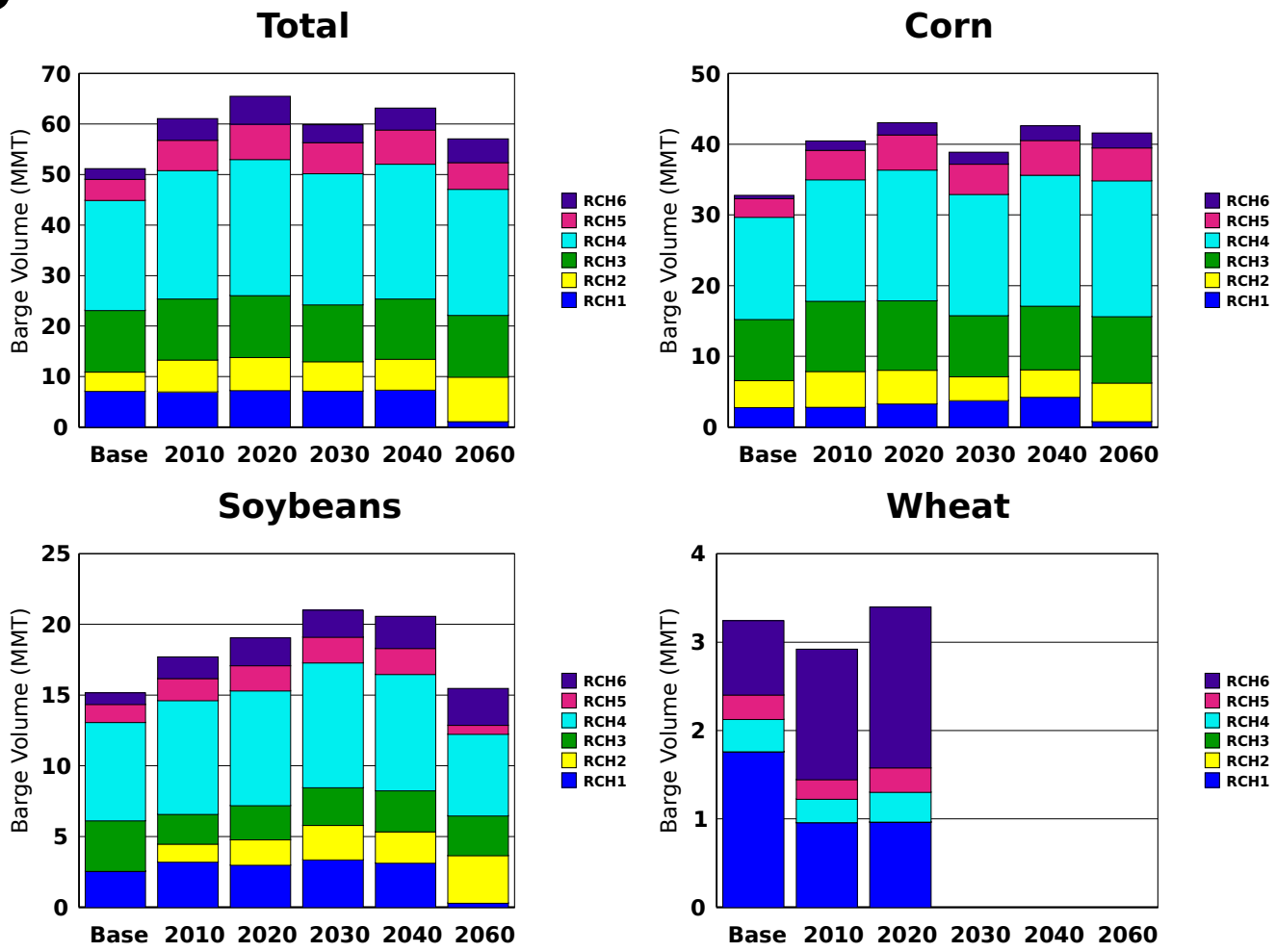
Base Case Projections: Exports



Base Case Projections: US Exports by Port Area



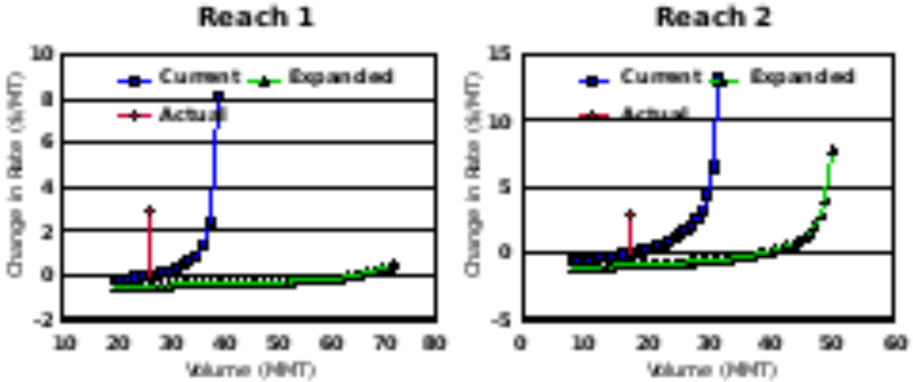
Base Case Projections: Barge Reach Volumes

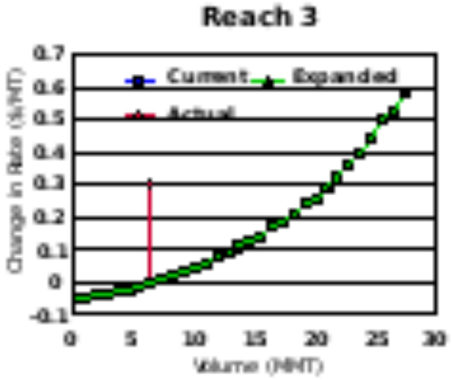


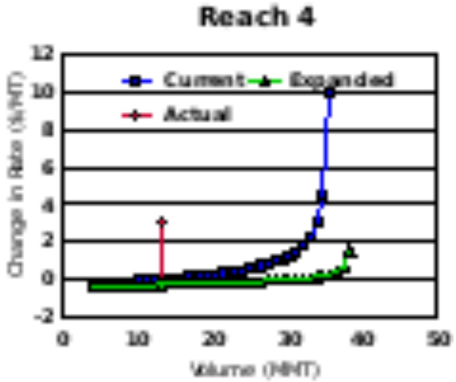
Delay costs and expansion

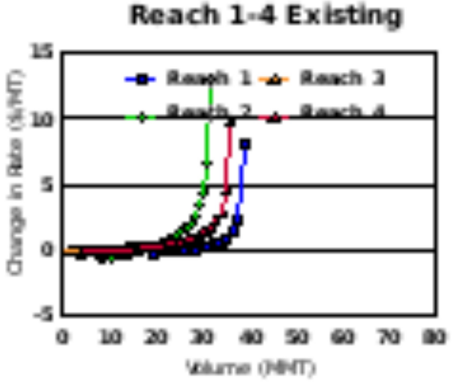
- Assume expansion adopted in 2020
- Simulate delay costs
  - With and with/out changes in other traffic

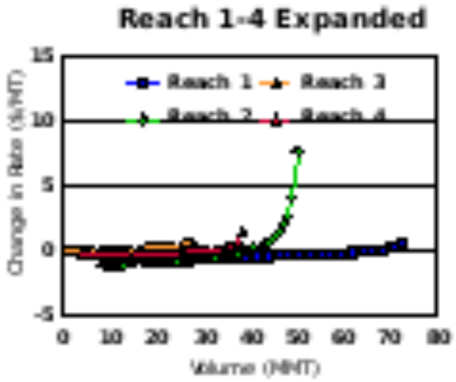
Range Delay Functions (Grain Volumes Only)



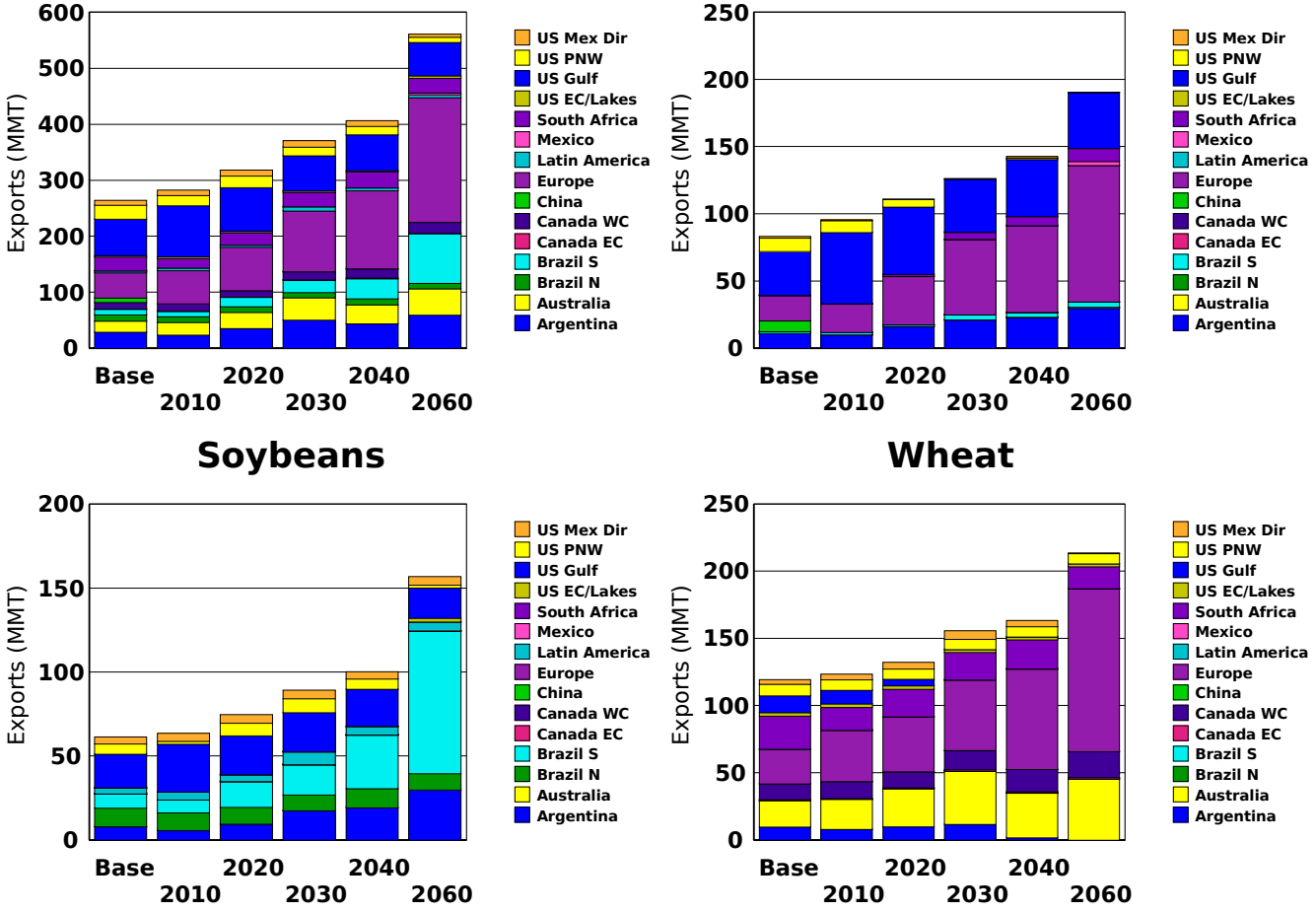




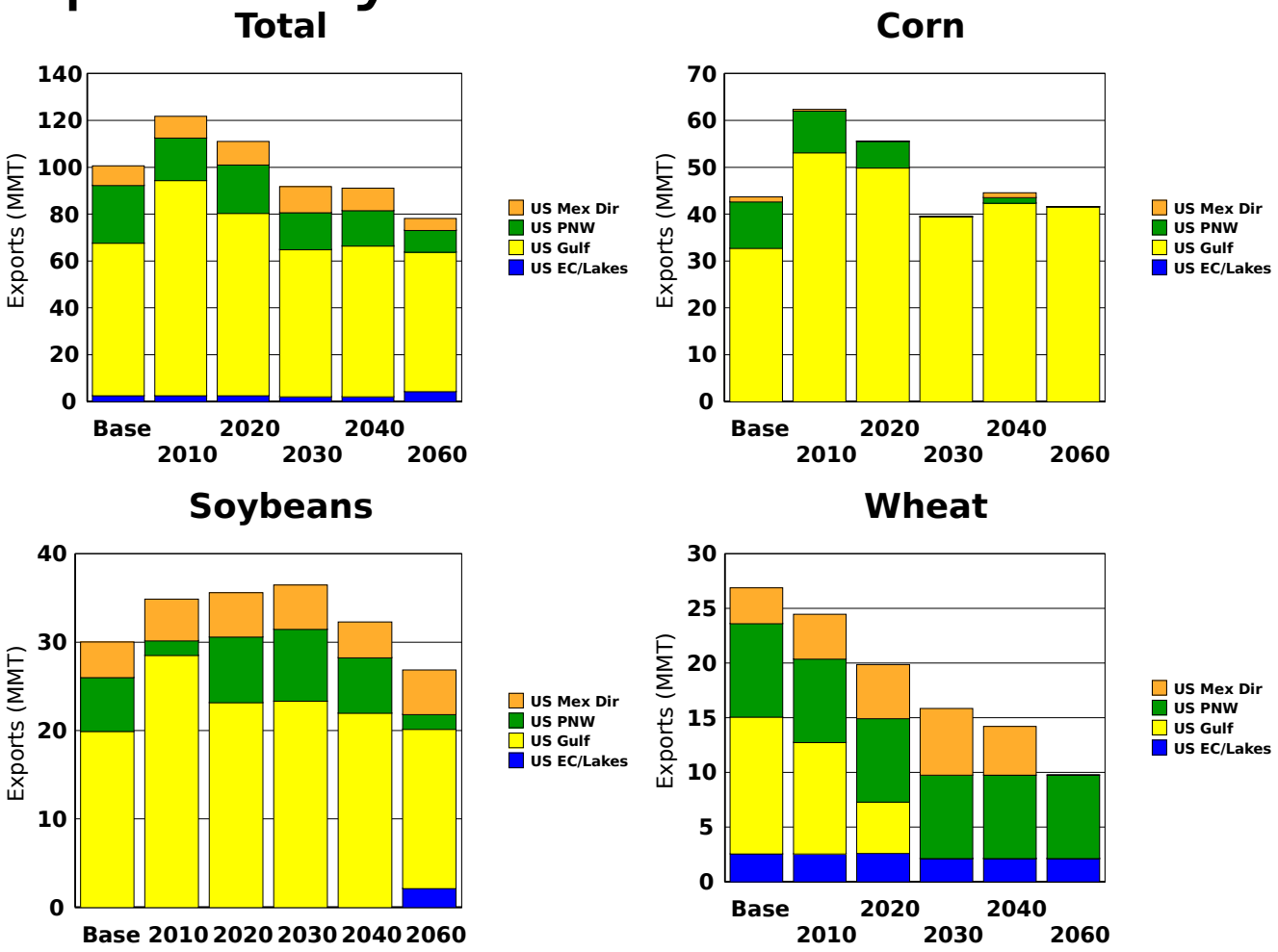




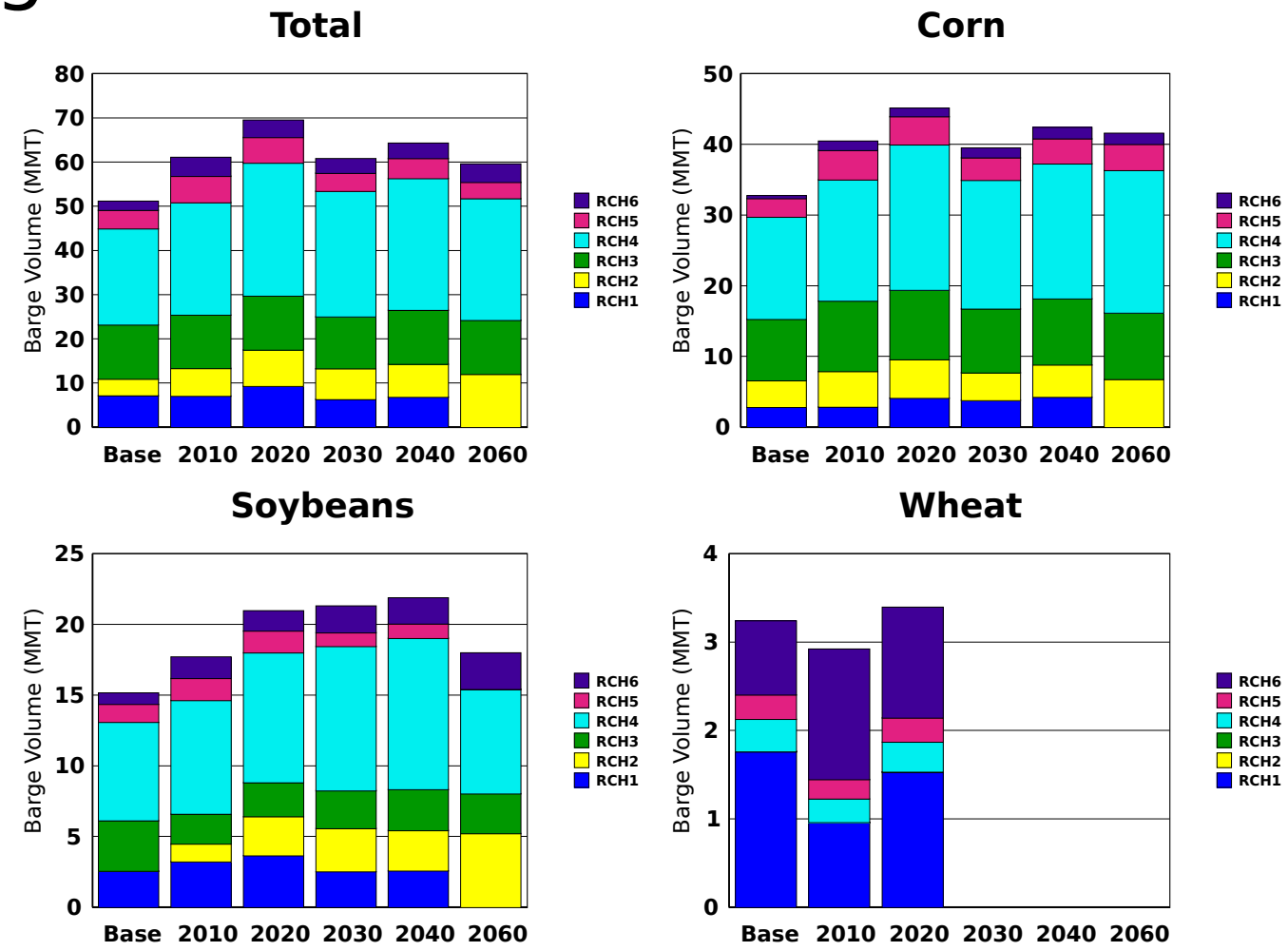
Expanded Barge Capacity: Exports



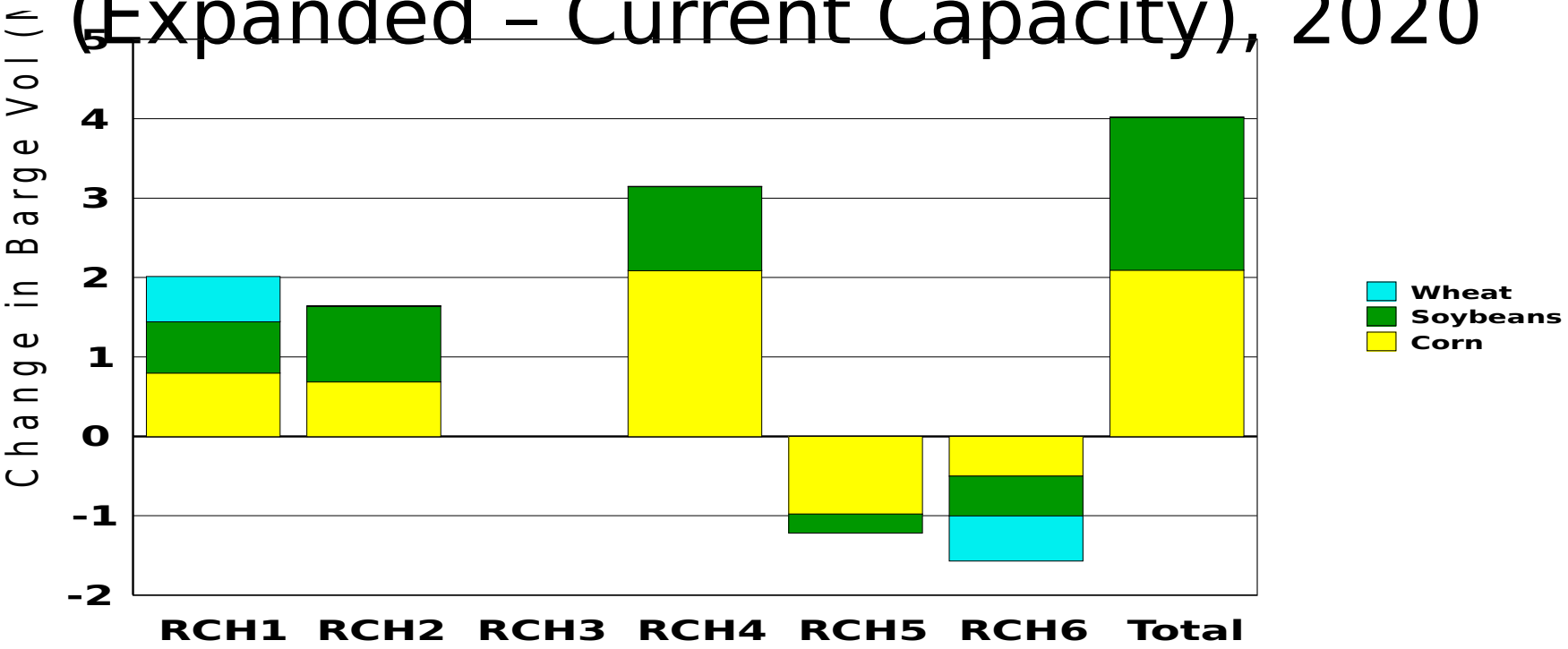
Expanded Barge Capacity: US Exports by Port Area



Expanded Barge Capacity: Barge Reach Volumes



Change in Barge Volume (Expanded – Current Capacity), 2020



- Positive changes in Reach 1, 2 and 4
- Negative in Reach 5 and 6
- KEY: Interreach competition based on delay costs!

Barge Delay Costs

Delay Costs: Current Barge Capacity ($/MT Barge Volume (Grain + NonGrain)

	Base	2010	2020	2030	2040	2060
Reach 1	-0.12	-0.04	-0.02	-0.09	-0.04	-0.14
Reach 2	-0.19	0.08	0.14	-0.08	0.03	0.55
Reach 3	0.10	0.10	0.10	0.08	0.09	0.10
Reach 4	0.45	0.86	1.08	0.93	1.04	0.80

Delay Costs: Expanded Barge Capacity ($/MT Barge Volume (Grain + NonGrain)

	Base	2010	2020	2030	2040	2060
Reach 1	-0.12	-0.04	-0.46	-0.47	-0.47	-0.47
Reach 2	-0.19	0.08	-0.90	-0.94	-0.92	-0.79
Reach 3	0.10	0.10	0.10	0.09	0.10	0.10
Reach 4	0.45	0.86	0.06	0.00	0.05	-0.03

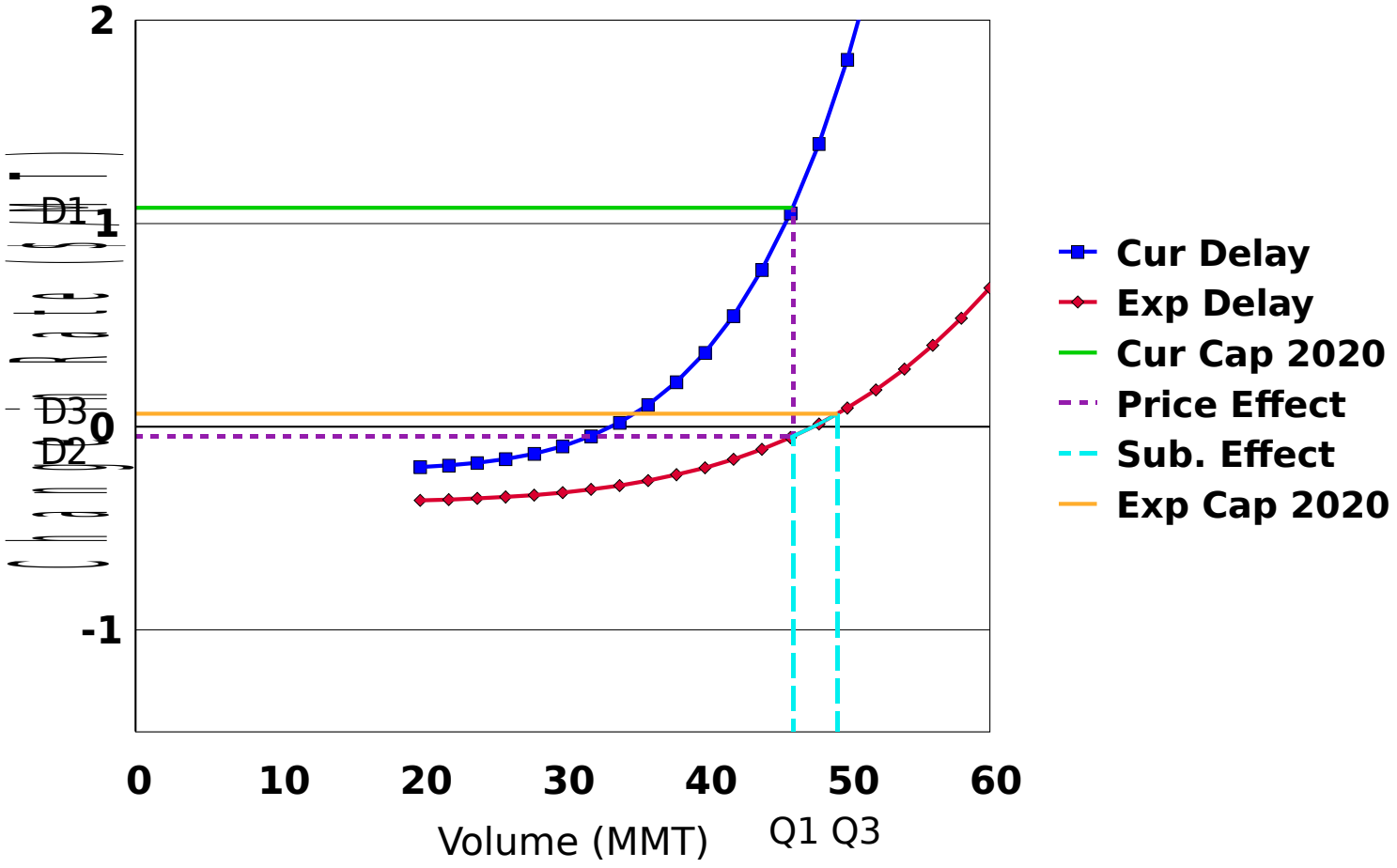
Delay Costs: Change (Expanded - Current)

	Base	2010	2020	2030	2040	2060
Reach 1	0.00	0.00	-0.44	-0.39	-0.42	-0.34
Reach 2	0.00	0.00	-1.04	-0.86	-0.95	-1.34
Reach 3	0.00	0.00	0.00	0.01	0.01	0.00
Reach 4	0.00	0.00	-1.01	-0.93	-0.99	-0.83

Effect on Delay Costs and Barge Volume of Expansion in Barge Capacity (See figure attached ref Reach 4)

- Current
  - volume Q1 is shipped via barge (grain + non-grain) at delay cost D1.
- Expansion in barge capacity
  - delay costs drop to D2 (price effect).
  - drop in delay costs to D2 reduces barge costs and allows a substitution of barge volume for rail.
  - Thus, barge volume increases from Q1 to Q3 and delay costs move along the delay cost curve for expanded capacity and increase to D3 (substitution effect).
- Net effect : shift from
  - quantity from Q1 to Q3
  - delay cost from D1 to D3.
- These effects occur at reaches 1,2 and 4, and the size of each effect varies by reach. Reach 3 is only affected by substitution effects (due to changes on the other reaches) as delay costs are unchanged.

Effect on Delay Costs and Barge Volume of Expansion in Barge Capacity (Reach 4, 2020)



Summary of Delay Cost Impacts and Expansion

- Effects of expansion on the change in equilibrium between the base case without expansion in 2020 and that with an expansion was also evaluated are:
  - reduced delay costs of $61 million (about $1.02/mt)
  - an increase in quantity shipped by barge resulting in a higher barge rate
    - About $50 million, or, $0.84/mt.
  - In total, barge shipping costs including delay costs are reduced by $11 million, or, $0.18/mt.
- Other impacts are for
  - reduced shipping costs by rail to ports and reaches of about $59 million
  - increased rail shipments to domestic
  - slightly greater ocean shipping costs, $10.4 million, due to an increase in shipping from the US Gulf.
- Taken together, the effect of the expansion is to reduce these costs by $52 million.

Summary: Delay Cost Impacts and Expansion

- Effects of expansion on the change in equilibrium between the base case without expansion in 2020 and that with an expansion

Impact	$million	$/mt
reduced delay costs	61	1.02
increase barge shipments (higher barge rates)	50	.84
Total	-11	-.18
reduced shipping costs by rail to ports and reaches	59	
slightly greater ocean shipping costs (more US Gulf shipments)	10.4	
Total	-52	

Sensitivity to non-grain traffic

- If non-grain traffic increases
  - this shifts delay costs upward along the curve for total barge volume
  - reduces the volumes of grain that can be shipped at a given delay cost.
- If the non-grain traffic grows by 50%, (i.e., cumulatively over the base period to 2020),
  - delay costs increase and grain traffic would decrease by about 7 mmt.
  - without expansion, the delay costs in 2020 would increase on each Reach.
    - Reach 4 would increase from $1.08 to $2.15/mt.
  - With an expanded barge capacity
    - these delay costs would increase to $0.54/mt.
    - Expansion would result in reduced delay costs on each Reach.
    - Delay costs would decrease by $61 to $76 million depending on the percentage increase in non-grain traffic with most of the delay costs

Impacts of other traffic on Change in Delay Costs: 2020

- Sensitivity of Delay Costs to Changes in Non-Grain Barge Traffic, 2020Delay Costs: Current Barge Capacity 2020 ($/MT Barge Volume (Grain + Non-Grain))

	2020	+10%	+20%	+30%	+40%	+50%	
Reach 1	-394	-15	676	1,752	2,932	4,560	
Reach 2	2,631	2,804	3,970	6,027	8,618	11,651	
Reach 3	1,222	1,251	1,363	1,529	1,700	1,876	
Reach 4	28,989	31,148	33,737	37,544	42,725	48,561	
Total 1-4	32,448	35,188	39,746	46,852	55,976	66,648	

- Delay Costs: Expanded Barge Capacity 2020 ($/MT Barge Volume (Grain + Non-Grain))

	Exp 2020	+10%	+20%	+30%	+40%	+50%	
Reach 1	-13,642	-13,486	-13,313	-13,122	-12,911	-12,678	
Reach 2	-18,355	-17,784	-17,134	-16,397	-15,567	-14,636	
Reach 3	1,222	1,394	1,571	1,753	1,940	2,132	
Reach 4	1,896	4,148	6,658	9,433	12,490	15,807	
Total 1-4	-28,880	-25,728	-22,218	-18,334	-14,048	-9,375	

- Delay Costs: Change 2020 (Expanded - Current Capacity)

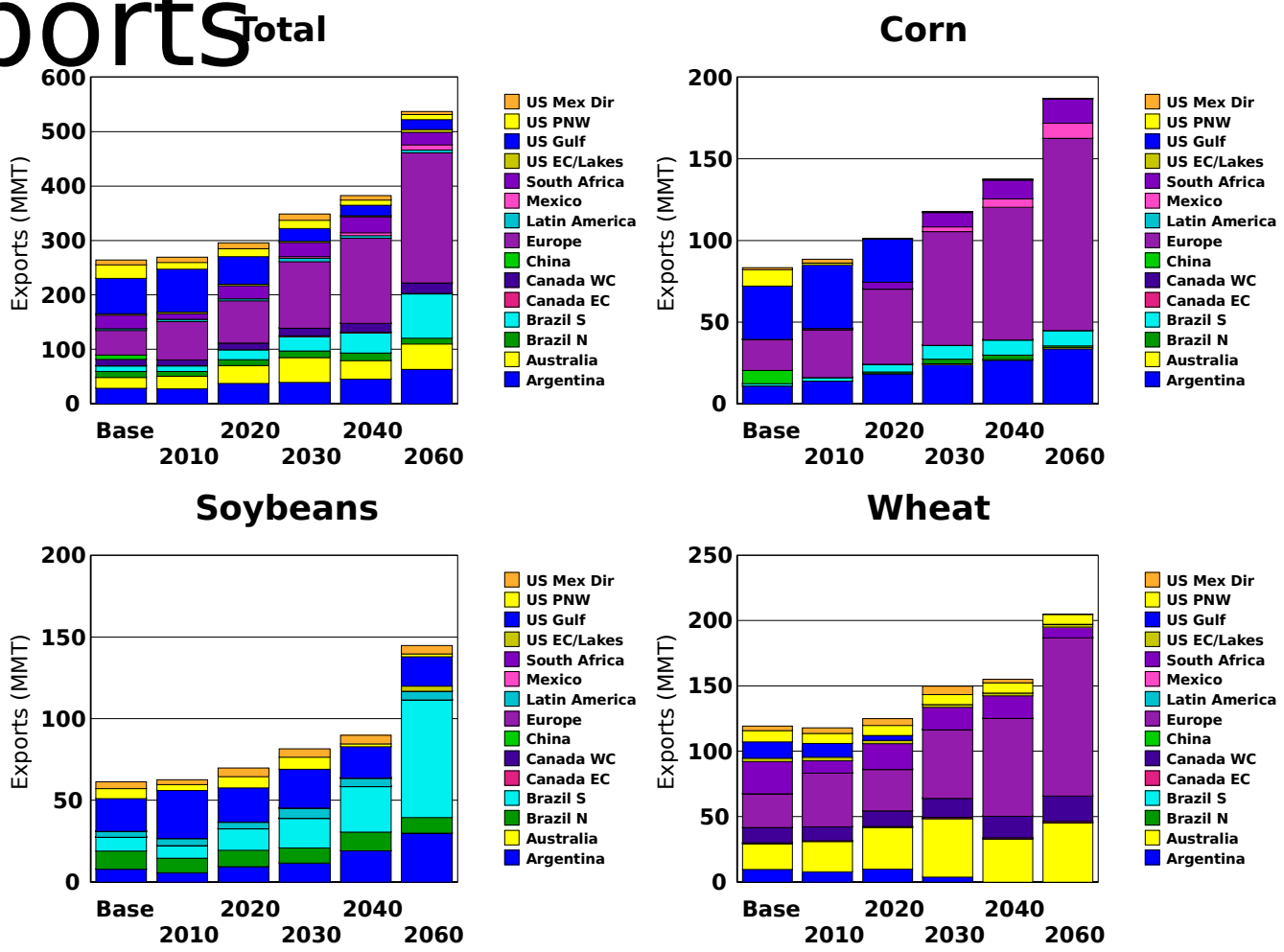
	2020	+10%	+20%	+30%	+40%	+50%	
Reach 1	-13,248	-13,471	-13,990	-14,875	-15,843	-17,238	
Reach 2	-20,987	-20,588	-21,103	-22,424	-24,185	-26,287	
Reach 3	0	143	208	224	240	256	
Reach 4	-27,093	-27,000	-27,079	-28,111	-30,235	-32,754	
Total 1-4	-61,327	-60,916	-61,964	-65,186	-70,024	-76,022	

High Ethanol: EIA 2006 (over time evolve to 11 bill barrels)

Maximum Area Limit Relative to Projected Base Area to Achieve a Solution (%)

	Base	*2010*	*2020*	*2030*	*2040*	*2060*
US	100	107	107	107	107	107
ROW	107	109	118	132	129	134

High Ethanol Demand: Exports

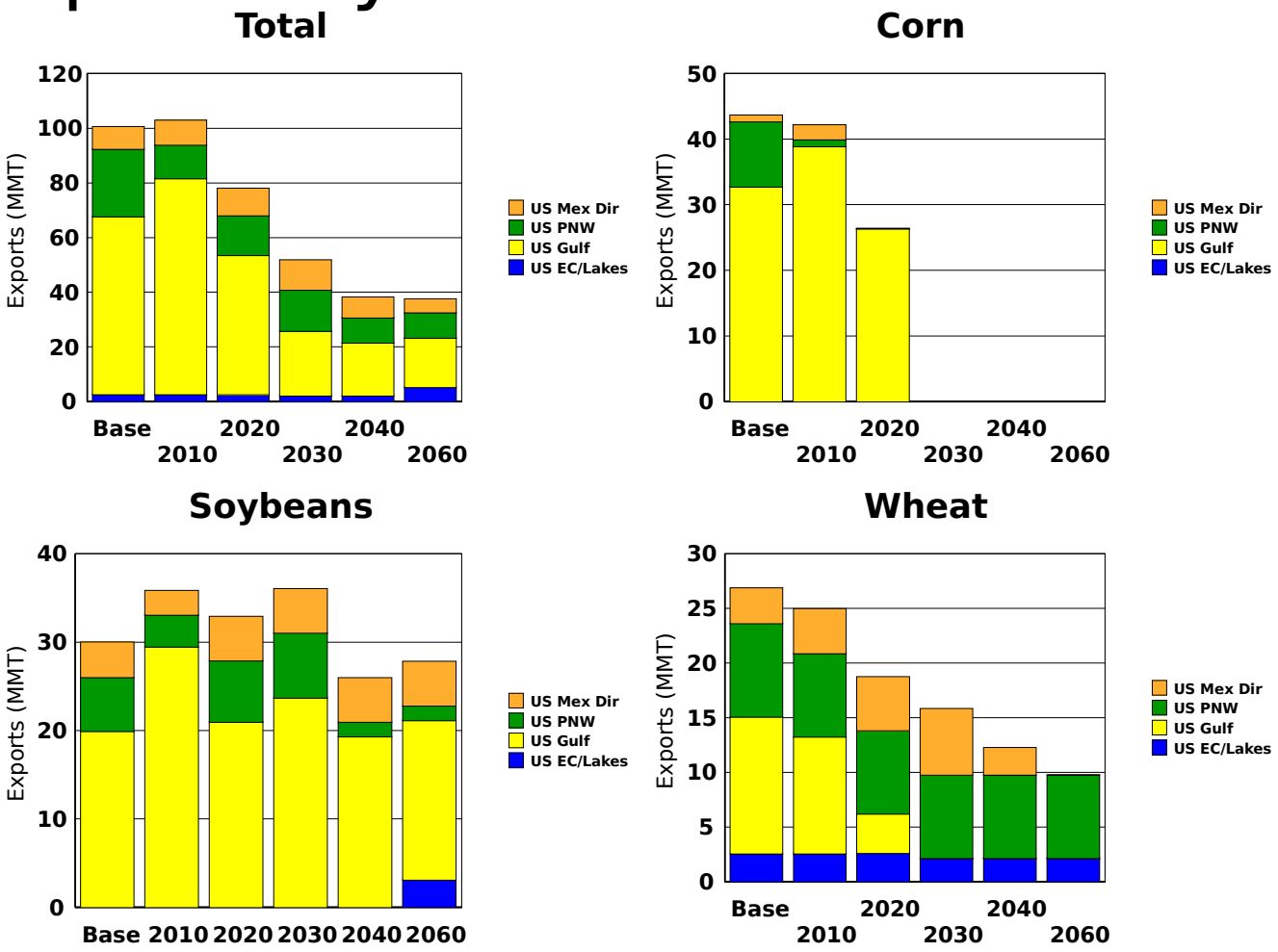


Changes in country exports

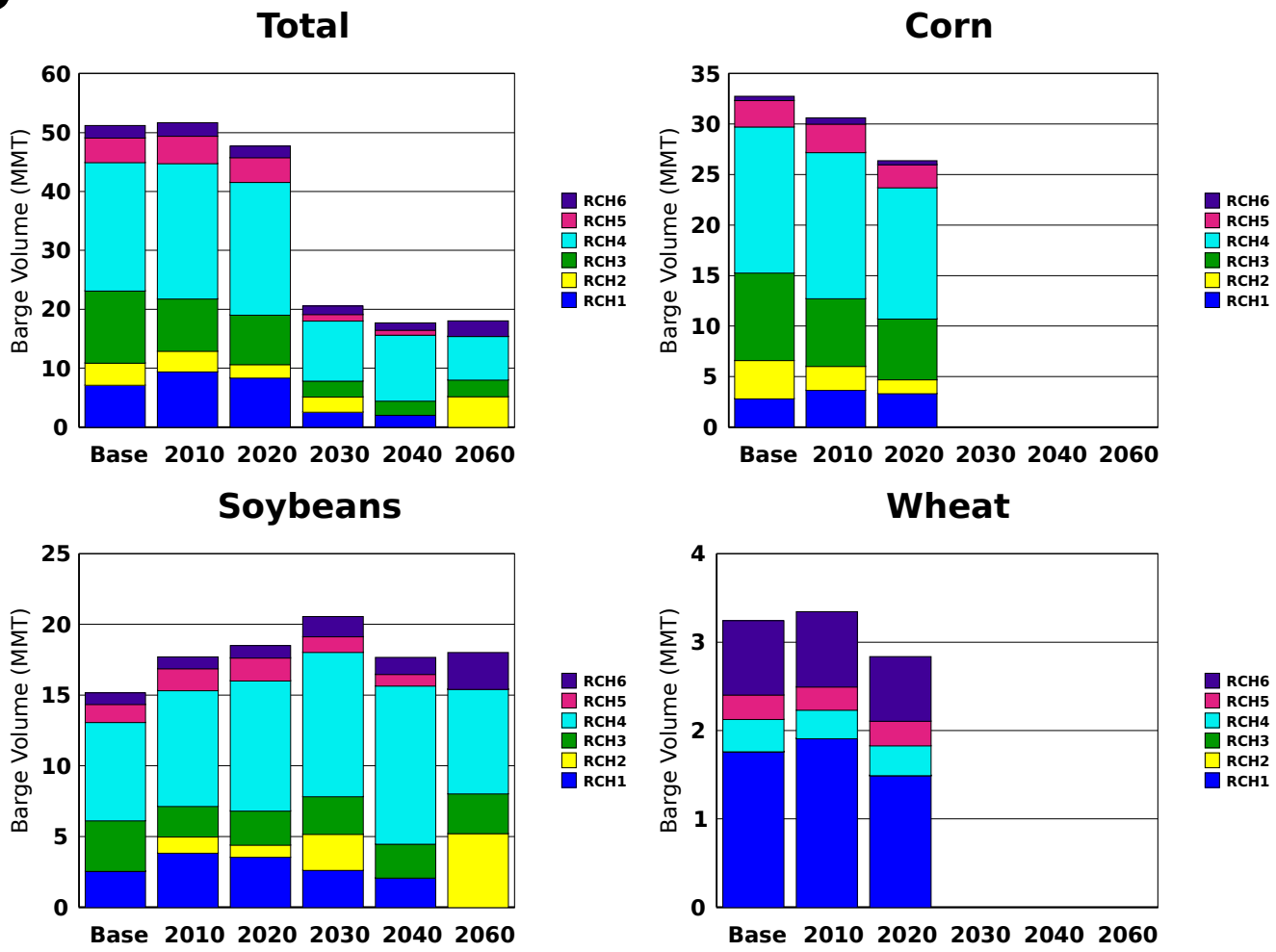
- Exports from the following countries increase sharply, with the change from the base to 2020 in ( ):
  - Argentine corn (16 to 19 mmt)
  - Europe and Eastern European corn (38 to 48 mmt);
  - Wheat exports from Australia increase (28 mmt to 32 mmt), Europe decreases (36 to 32 mmt), US decreases from 14.9 to 13.8; and Canada and Argentina are unchanged.

- Exports from the United States decline from 101 to 78 mmt by 2020
  - vs. the base case which increased from 101 to 111 mmt.
  - Gulf exports decrease (76 to 51)
  - PNW change from 23 to 15 mmt.
  - Most of the decline is in corn and wheat shipments.
  - Soybeans decline to 28 mmt for the same reasons described above

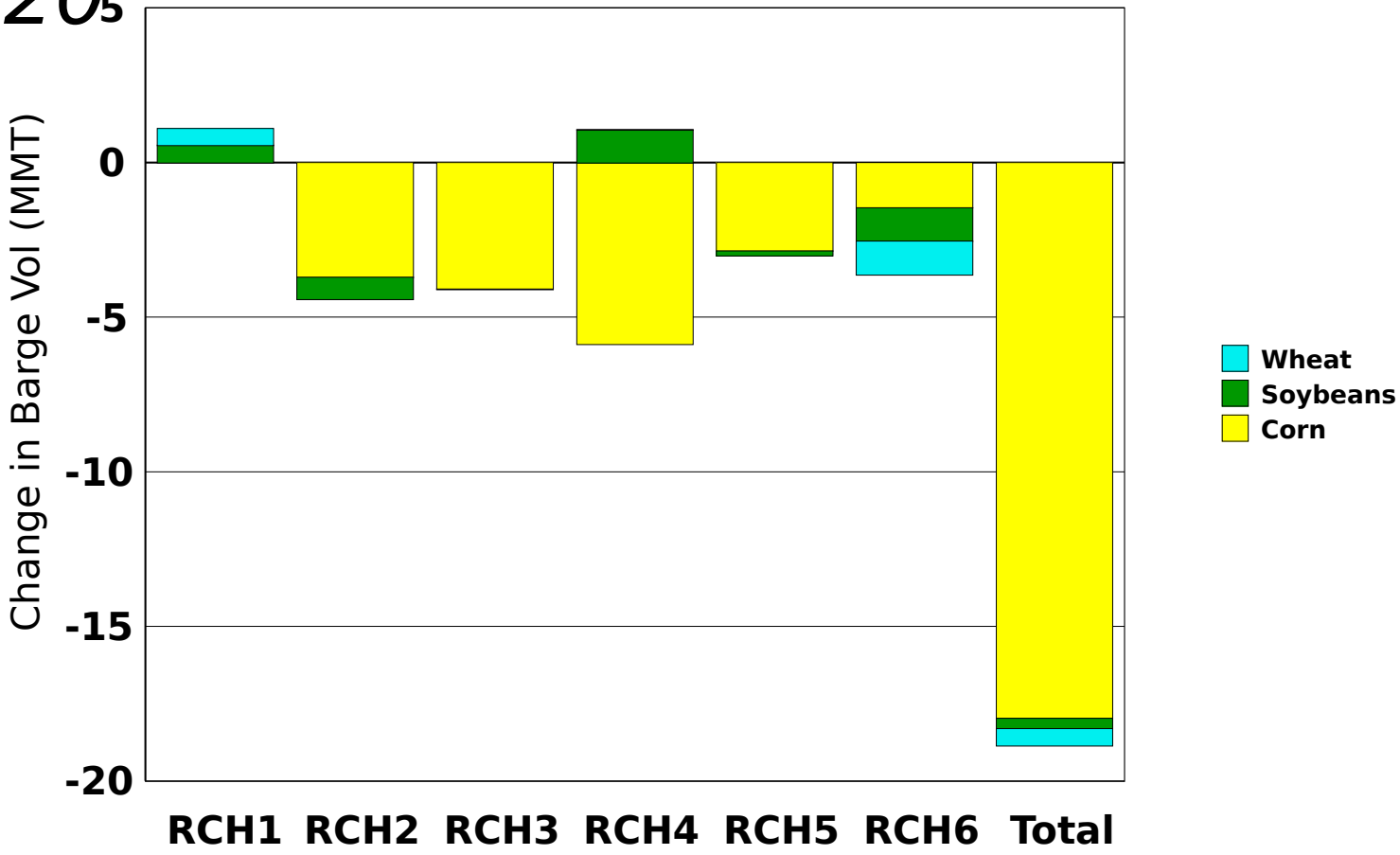
High Ethanol Demand: US Exports by Port Area



High Ethanol Demand: Barge Reach Volume



Change in Barge Reach Volumes High *Ethanol Demand – Current Capacity 2020*$_5$



Changes in Barge Shipments by 2020

- Below are the declines in barge shipments by reach in 2020 (000 mt)
  - Reach 1 +1086
  - Reach 2 -4308
  - Reach 3 -3814
  - Reach 4 -4404
  - Reach 5 -2820
  - Reach 6 -3529
  - Total: -17,788

Major Changes in Flows:

- Within the United States, grain flows in 2010 change substantially
  - drastic increase in shipment to the Eastern and Western corn belts
    - reflecting the increase in domestic demand for ethanol use.
  - Changes in flows from the Northern Plains
    - previously exported most of its corn through the PNW
    - substantial portion of these are now shifted to domestic shipments.
- Substantial changes in flows from US domestic regions to the Reaches and port areas. Most important are shipments from
  - Iowa River to Reach 2
  - Minnesota River to Reach 3
  - Reductions from most regions to New Orleans
    - an increase from Illinois South to New Orleans
  - Substantial reductions from Northern Plains to the PNW
    - declining from 10.5 mmt to 4.2 mmt.

High Ethanol Demand Shipments from Production Regions to Reaches, 2010

Production Region	Export Region						Toledo	Duluth	LA Gulf	PNW	Texas Gulf
	RCH1	RCH2	RCH3	RCH4	RCH5	RCH6	TOL	USD	USNO	USNW	UST
USCP							433			660	4,660
USCPR									3,913		
USD									1,555		831
USIAR		1,152									
USILN				22,976					5,609		
USILS	1,739								6,048		
USINR					4,629						
USMN											
USMNR			8,866								
USMOR	4,408										
USMOW	2,310										
USNP								2,147		5,996	
USOH	963					2,257			2,939		
USPNW										1,798	1,843
USSP											
USWIS		2,368									
USWNP										3,825	

High Ethanol Demand Shipments from Production to Consumption Regions, 2010

Production Region	Consumption Region										
	MEXC	USCPC	USDC	USECBC	USNEC	USNPC	USPNWC	USSEC	USSPC	USWC	USWCBC
USCP	1,109	31,405						1,685			
USCPR		13,851	5,619								2,561
USD			9,714								
USIAR											20,024
USIAW											53,591
USILN				16,783							
USILS				6,871				12,314			
USINN				28,089							
USINR				2,008							
USMI				11,228							
USMN	4,528						3,288			3,339	2,058
USMNR											5,814
USMOR				205							4
USMOW				2,333					9,610		966
USNE				828	8,989						
USNP	1,703	10		5,415		14,353			682	5,404	
USOH					3,865			11,250			
USPNW							2,257			2,065	
USSE								22,259			
USSP	1,757								12,615		
USW										2,414	
USWIS				3,350							829
USWIW				2,394							16
USWNP						269					

Change in Export Reach Flows (HE 2010 – Base Case)

Production Region	Export Region						Toledo	Duluth	LA Gulf	PNW	Texas Gulf
	RCH1	RCH2	RCH3	RCH4	RCH5	RCH6	TOL	USD	USNO	USNW	UST
USCP	0	0	0	0	0	0	26	0	0	660	-240
USCPR	0	0	0	0	0	0	0	0	1,466	0	0
USD	0	0	0	0	0	0	0	0	691	0	-214
USIAR	0	-2,629	0	0	0	0	0	0	0	0	0
USILN	0	0	0	1,205	0	0	0	0	5,609	0	0
USILS	169	0	0	0	0	0	0	0	6,048	0	0
USINR	0	0	0	0	445	0	0	0	0	0	0
USMN	0	0	0	0	0	0	0	0	0	-2,656	0
USMNR	0	0	-3,369	0	0	0	0	0	0	0	0
USMOR	903	0	0	0	0	0	0	0	0	0	0
USMOW	989	0	0	0	0	0	0	0	0	0	-340
USNP	0	0	0	0	0	0	0	0	0	-8,331	-138
USOH	205	0	0	0	0	207	0	0	1,491	0	0
USPNW	0	0	0	0	0	0	0	0	0	0	-1,016
USSP	0	0	0	0	0	0	0	0	0	-1,608	0
USWIS	0	2,368	0	0	0	0	0	0	0	0	0
USWNP	0	0	0	0	0	0	0	0	0	-379	0

Change in Domestic Flows (HE 2010 – Base Case)

Production Region	Consumption Region										
	MEXC	USCPC	USDC	USECBC	USNEC	USNPC	USPNWC	USSEC	USSPC	USWC	USWCBC
USCP	1,109	219	0	0	0	0	0	511	0	0	0
USCPR	0	6,677	-658	0	0	0	-3,165	0	0	-4,927	-61
USD	0	0	1,416	0	0	0	0	0	0	0	0
USIAR	0	0	0	0	0	0	0	0	0	0	6,595
USIAW	0	0	0	0	0	0	0	0	0	0	9,810
USILN	0	0	0	2,528	0	0	0	-702	0	0	0
USILS	0	0	0	1,746	0	0	0	-3,269	0	0	0
USINN	0	0	0	5,524	0	0	0	0	0	0	0
USINR	0	0	0	585	0	0	0	0	0	0	0
USMI	0	0	0	2,146	0	0	0	0	0	0	0
USMN	-68	0	0	0	0	0	3,288	0	-3,832	-254	268
USMNR	0	0	0	0	0	0	0	0	0	0	-971
USMOR	0	0	0	205	0	0	0	0	0	0	-230
USMOW	0	0	0	-133	0	0	0	0	2,099	0	270
USNE	0	0	0	213	1,268	0	0	0	0	0	0
USNP	-327	10	0	2,753	0	4,124	0	0	682	5,404	0
USOH	0	0	0	0	-711	0	0	2,706	0	0	0
USPNW	0	0	0	0	0	0	106	0	0	66	0
USSE	0	0	0	0	0	0	0	3,745	0	0	0
USSP	148	0	0	0	0	0	0	0	1,919	0	0
USW	0	0	0	0	0	0	0	0	0	226	0
USWIS	0	0	0	-4,138	0	0	0	0	0	0	473
USWIW	0	0	0	-612	0	0	0	0	0	0	1
USWNP	0	0	0	0	0	54	0	0	0	0	0

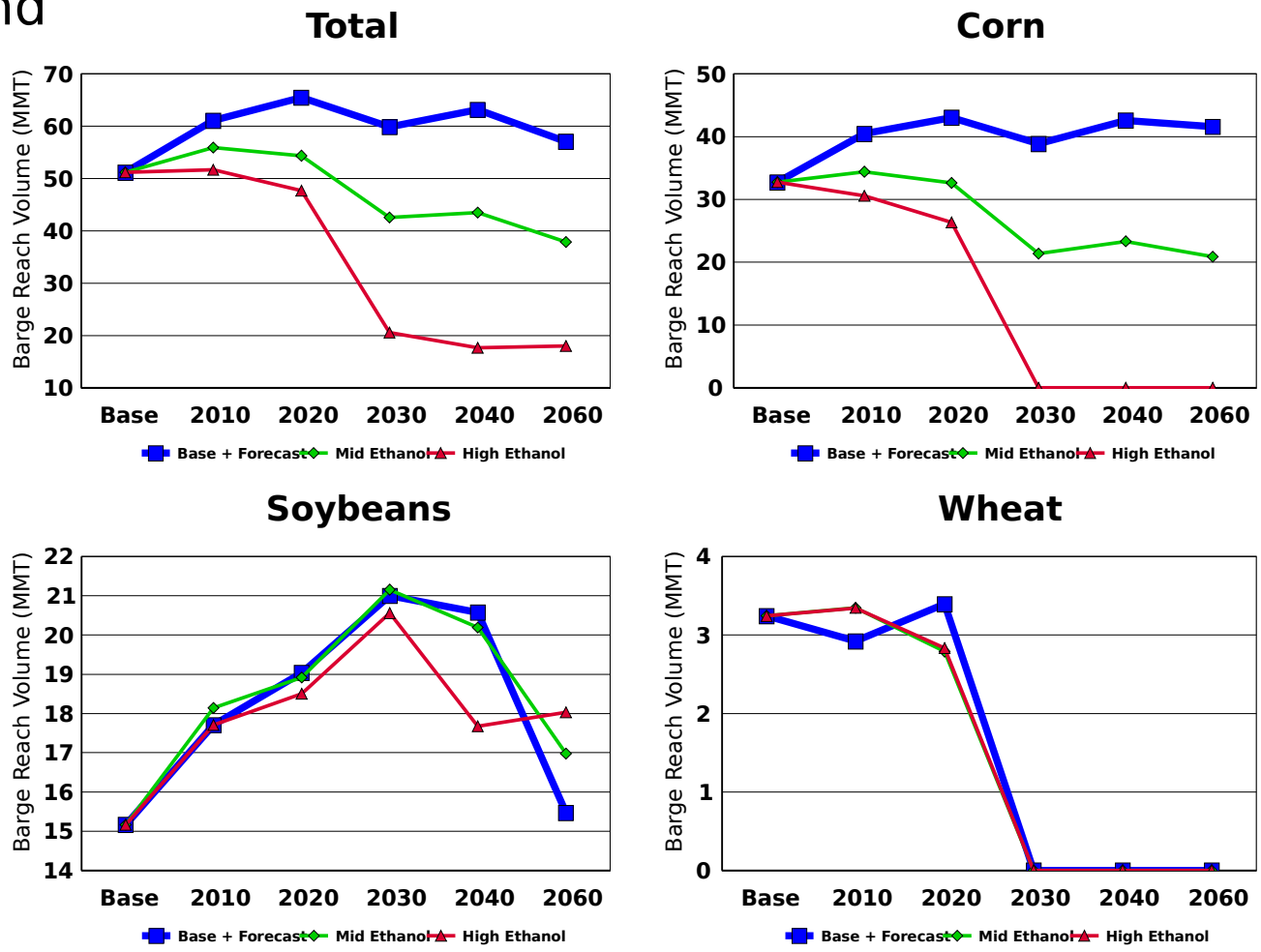
Change in Export Reach Flows (HE 2020 – Base 2020)

Production Region	Export Region RCH1	RCH2	RCH3	RCH4	RCH5	RCH6	Toledo TOL	Duluth USD	LA Gulf USNO	PNW USNW	Texas Gu UST
USCP	0	0	0	0	0	0	0	0	0	0	0
USCPR	0	0	0	0	0	0	0	0	0	0	0
USD	0	0	0	0	0	0	0	0	0	0	-384
USIAR	0	-5,685	0	0	0	0	0	0	0	0	0
USILN	0	1,306	0	-4,404	0	0	0	0	-362	0	0
USILS	-172	0	0	0	0	0	0	0	-6,540	0	0
USINR	0	0	0	0	-2,820	0	0	0	0	0	0
USMN	0	0	0	0	0	0	0	0	0	568	0
USMNR	0	0	-3,814	0	0	0	0	0	0	0	0
USMOR	13	0	0	0	0	0	0	0	0	0	0
USMOW	547	0	0	0	0	0	0	0	0	0	0
USNP	0	0	0	0	0	0	0	0	0	-8,647	0
USOH	698	0	0	0	0	-3,529	0	0	305	0	0
USPNW	0	0	0	0	0	0	0	0	0	0	-165
USSP	0	0	0	0	0	0	0	0	0	0	0
USWNP	0	70	0	0	0	0	0	0	0	-3,860	0

Change in Domestic Flows (HE 2020 – Base 2020)

Production Region	Consumption Region										
	MEXC	USCPC	USDC	USECBC	USNEC	USNPC	USPNWC	USSEC	USSPC	USWC	USWCBC
USCP	-486	74	0	0	0	0	0	486	0	0	0
USCPR	1,013	2,291	-2,024	0	0	0	-226	0	0	0	-980
USD	0	0	14	0	0	0	0	0	0	0	387
USIAR	0	0	0	0	0	0	0	0	0	0	5,746
USIAW	0	0	0	0	0	0	0	0	0	0	154
USILN	0	0	0	3,786	0	0	0	0	-195	0	0
USILS	0	0	1,928	6,721	0	0	0	-2,034	0	0	0
USINN	0	0	0	81	0	0	0	0	0	0	0
USINR	0	0	0	2,839	0	0	0	0	0	0	0
USMI	0	0	0	31	0	0	0	0	0	0	0
USMN	-1,013	0	0	0	0	0	189	0	0	-163	5
USMNR	0	0	0	0	0	0	0	0	0	0	3,856
USMOR	0	0	0	178	0	0	0	0	0	0	-216
USMOW	0	0	0	-628	0	0	0	0	29	0	-181
USNE	0	0	0	5	23	0	0	0	0	0	0
USNP	486	3,070	0	-486	0	4,012	0	0	0	84	0
USOH	0	0	0	0	288	0	0	2,298	0	0	0
USPNW	0	0	0	-95	0	0	3	0	0	259	0
USSE	0	0	0	0	0	0	0	-1,698	0	0	0
USSP	0	0	0	0	0	0	0	0	22	0	0
USW	0	0	0	0	0	0	0	0	0	-257	0
USWIS	0	0	0	-6,012	0	0	0	0	0	0	5,960
USWIW	0	0	0	1,191	0	0	0	0	0	0	-1,184
USWNP	0	0	0	0	0	1	0	0	0	0	0

Comparison of Barge Reach Loadings: Base (4 billion), Mid (7.5 billion) and High Ethanol (12 billion) Demand



Qualified and Stylized Ethanol Impacts and Assumptions

- Above scenario requires that if EIA 2006 demand were to be realize, the model needs to make some extreme assumptions in order to get a solution. In particular, it required
  - expanding US acres by 7% reflecting approximately land available in CRP
  - increasing area available elsewhere in the world

- All these topics are debatable. Most important are those related to
  - yield increases
  - the ability to expand area in the United States
  - demand for non-ethanol corn

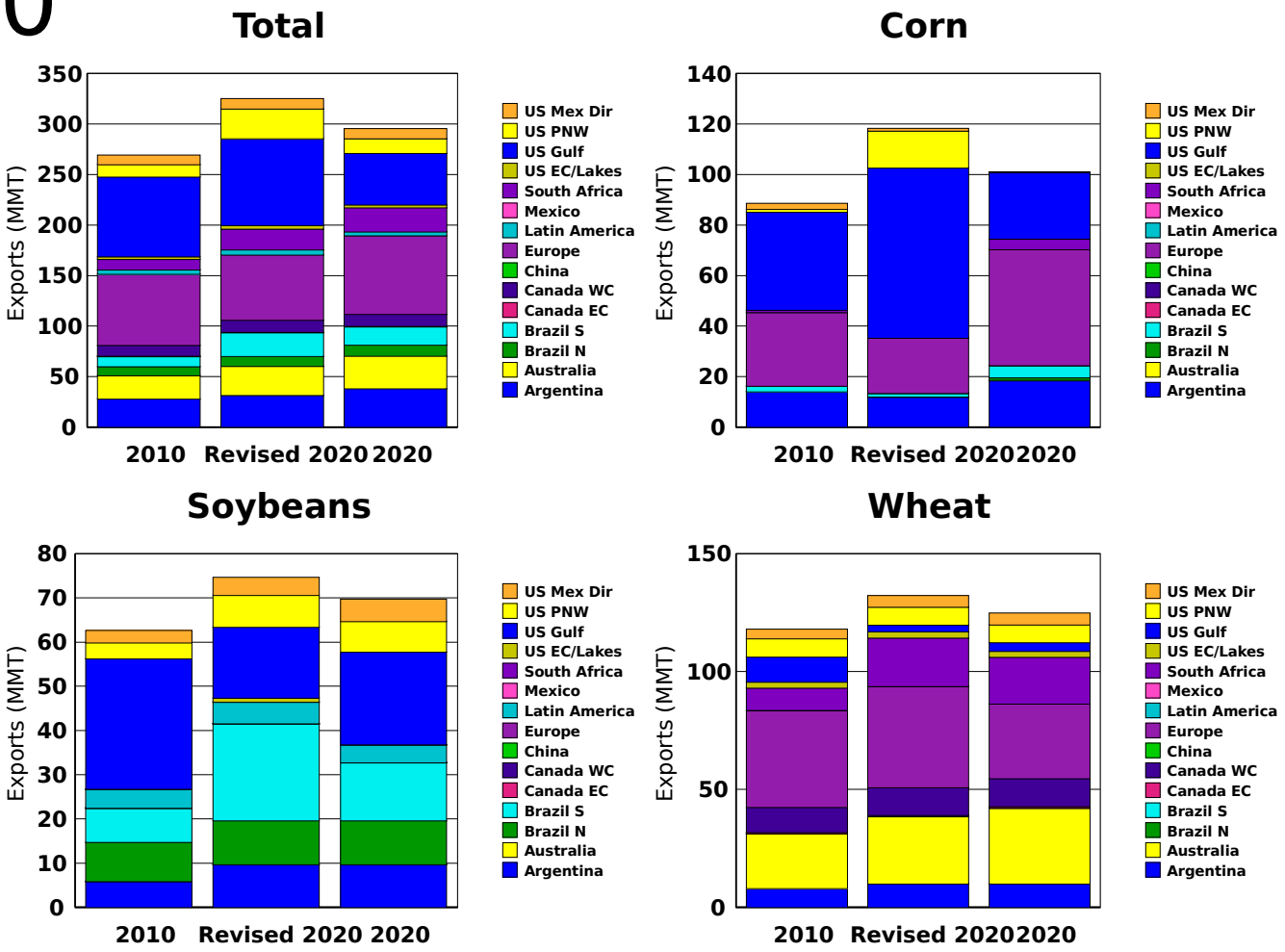
- Respecification to evaluate the robustness of the model and the assumptions about these critical variables. Alternative assumptions with respect to three variables for the year 2020.
  - yields were defined as 169 vs 161 in our base case
  - area harvested as defined as 79.2 versus 73-74 in our base case
  - ethanol conversion 3 gallons per bushes, versus 2.8

Qualified and Stylized Ethanol Impacts and Assumptions

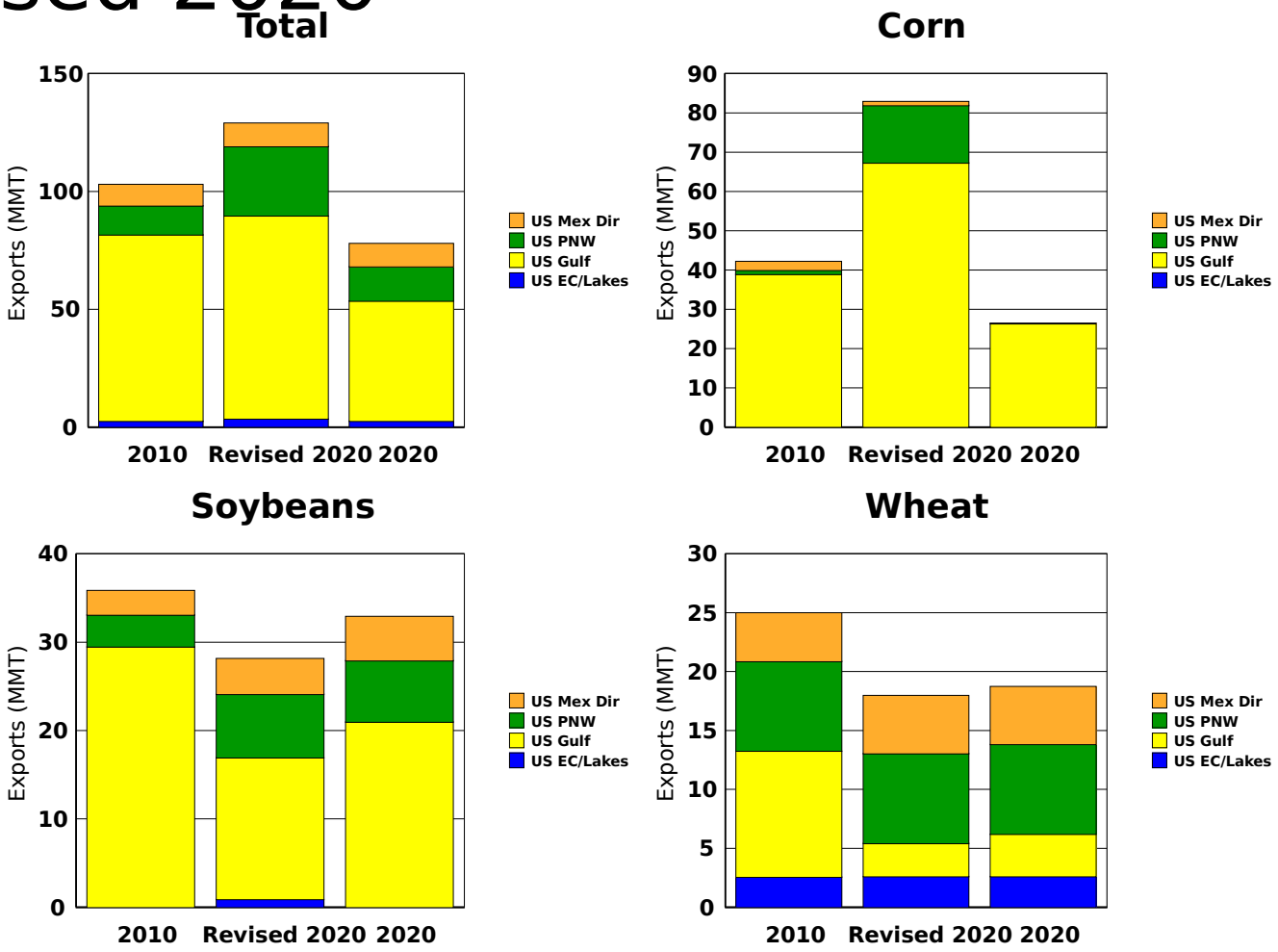
- Important differences
  - Exports from the United States, increase. By 2020.
    - Total exports are 129 mmt
    - 86 mmt and 29 mmt from the US Gulf and PNW respectively;
- Corn exports from the United States increase to 83 mmt
  - as opposed to decline to less than 26 mmt in 2020.
  - Corn exports also decrease from Argentina
- Soybean exports decrease (slightly) (US has greater advantage in corn than soybeans)
- Wheat exports would increase from each of the competitors.

  - US wheat exports decline
  - not as much as in our unrestricted high-ethanol case.

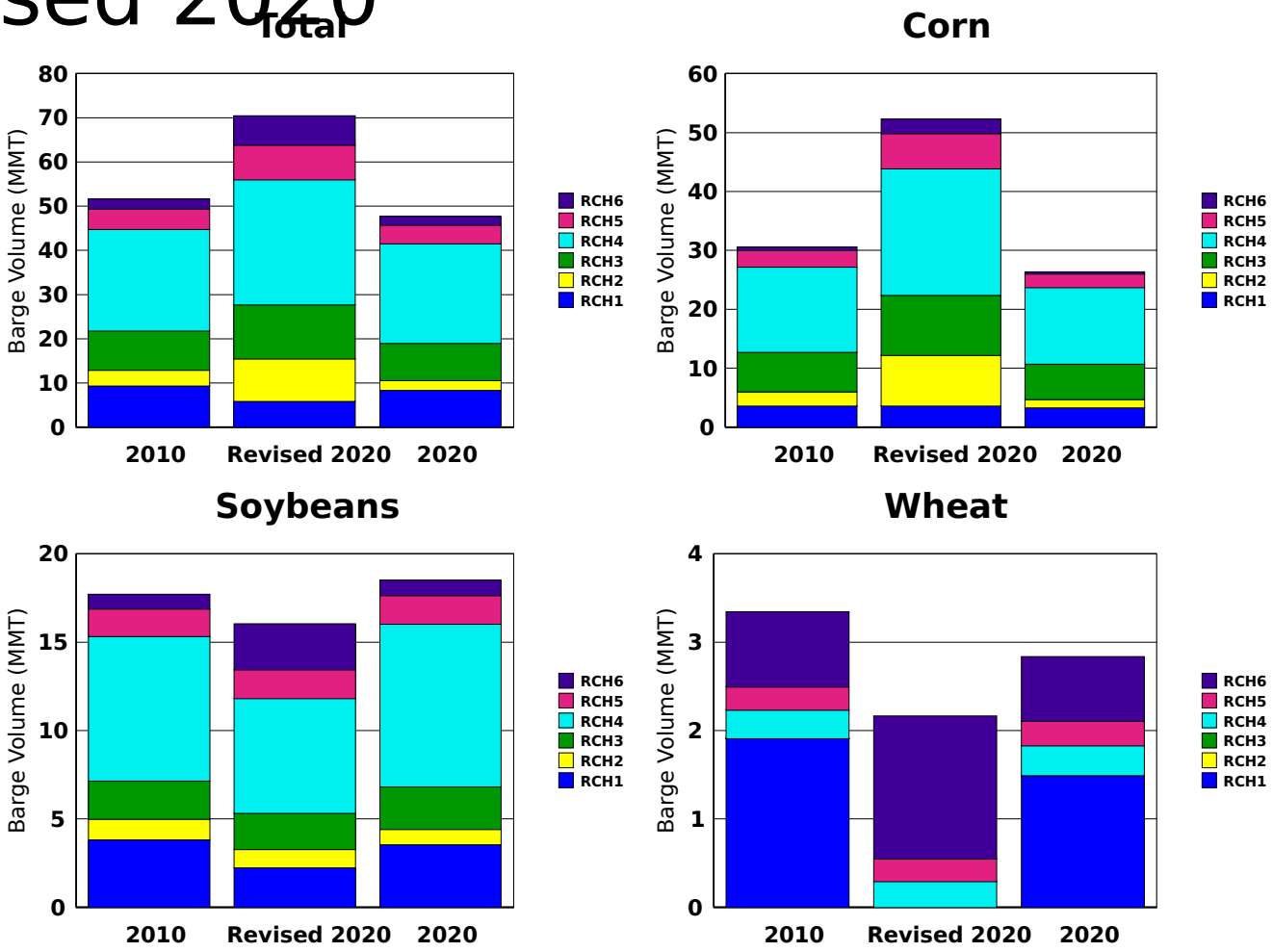
Comparison of Exports: Revised 2020



Comparison of Exports by Port Area: Revised 2020



Comparison of Barge Reach Loadings: Revised 2020



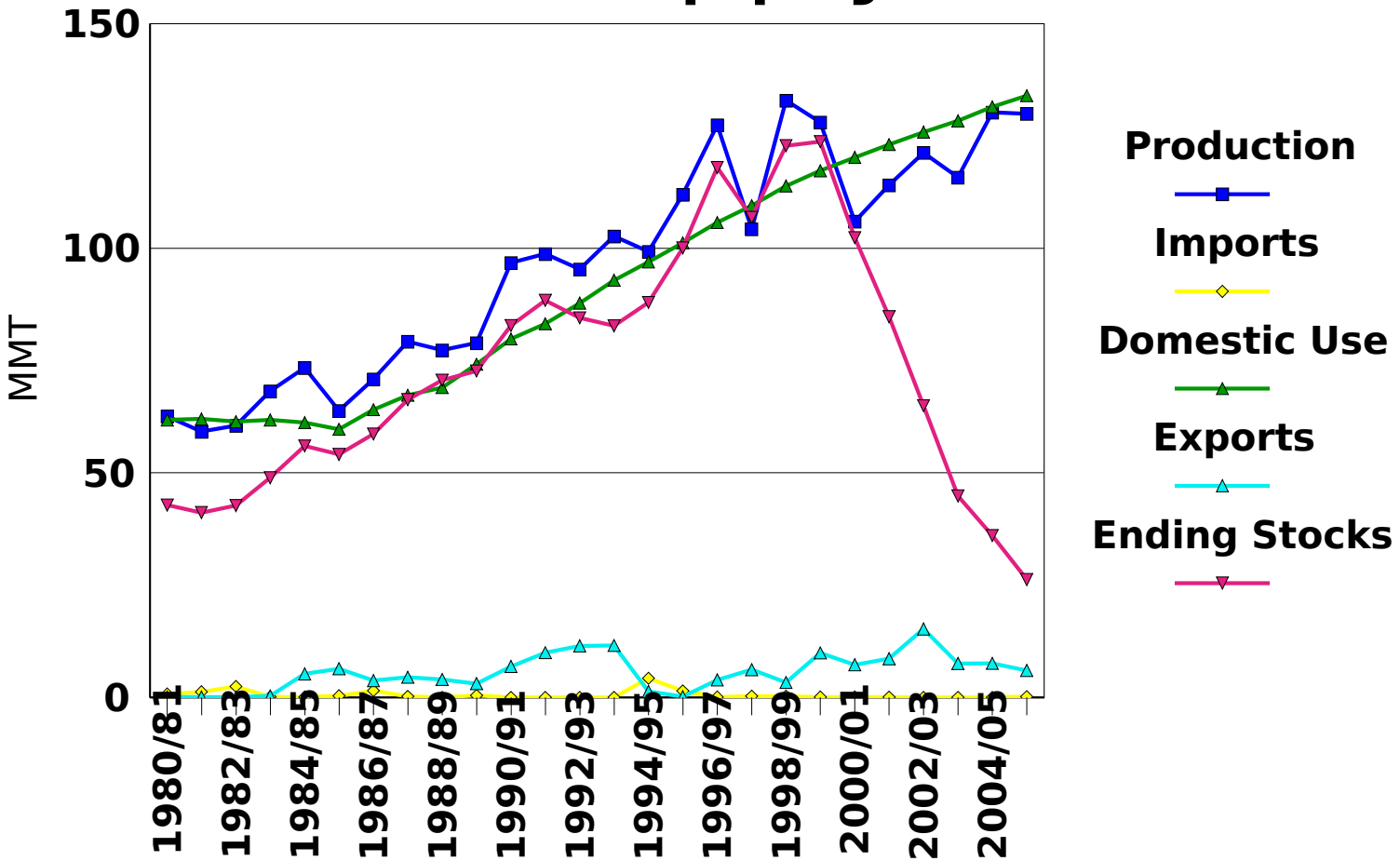
Impacts and Assumptions

- Most important reasons for the differences
  - Base case model also has underlying growth in world demands for corn and soybeans that must be satisfied;
  - The ability to expand area is important
    - Results suggest it would come mostly from wheat CRP and/or from other minor crops not included in the model.
    - Some could come from soybeans and wheat,
    - There is substantial international competitive pressures and demand for the United States to retain its soybean area;
  - Yield increases and ethanol conversion assume improvement based upon assumed anticipated genetic and technological improvements, whereas those from the base solution are based on a continuation of past trends.

China Scenarios: Most important

- China as importer or exporter of corn
- Strategic crops
  - Corn stocks are managed
  - Exports controlled
  - Past 0-16 mmt; avg 8 mmt
  - Recent suspension (and outlook for exports)
  - Potential to import
- Yields substantially less than US
  - Upside potential exists to increase production

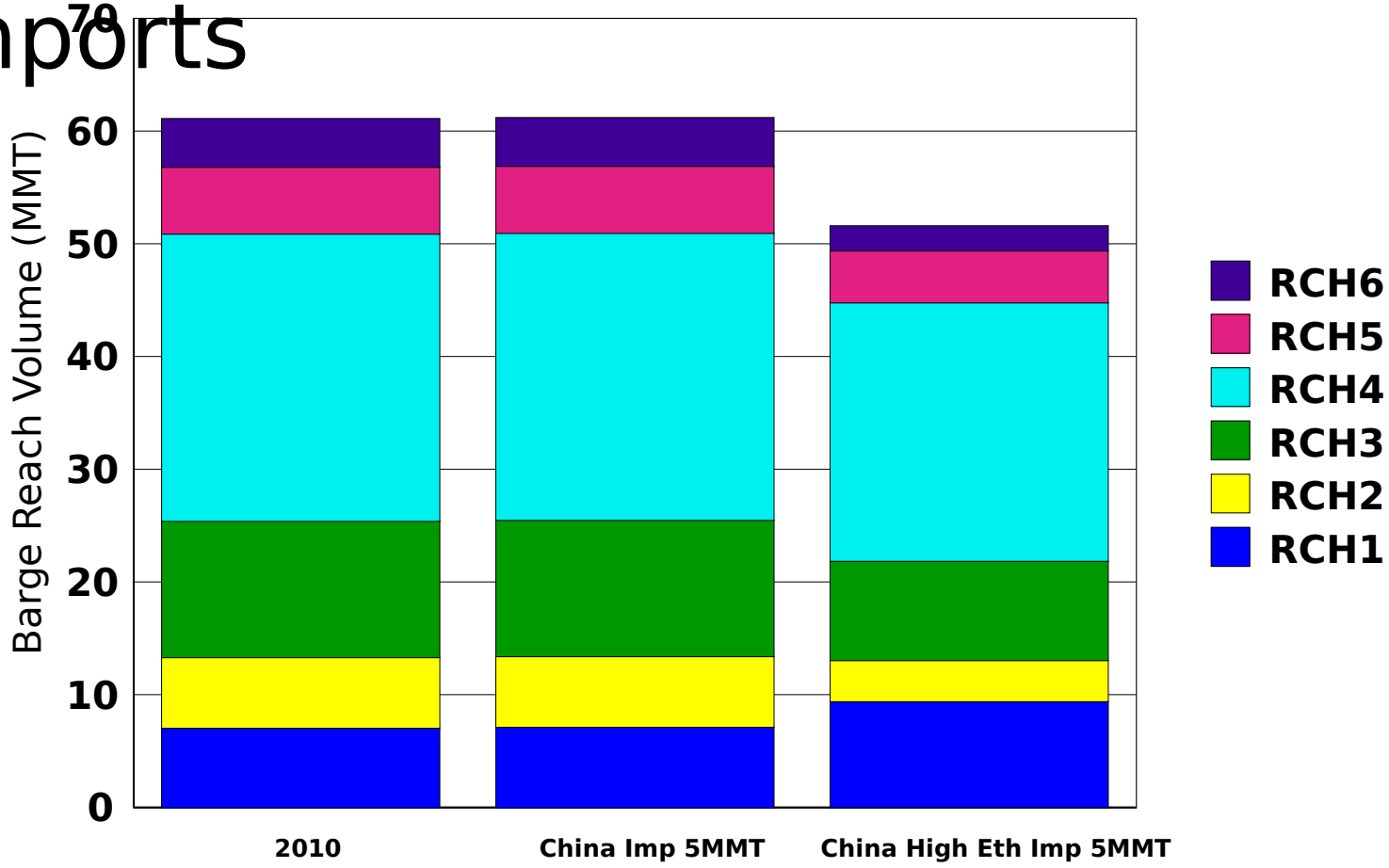
China Corn Supply Demand



China scenarios: evaluated at 2010

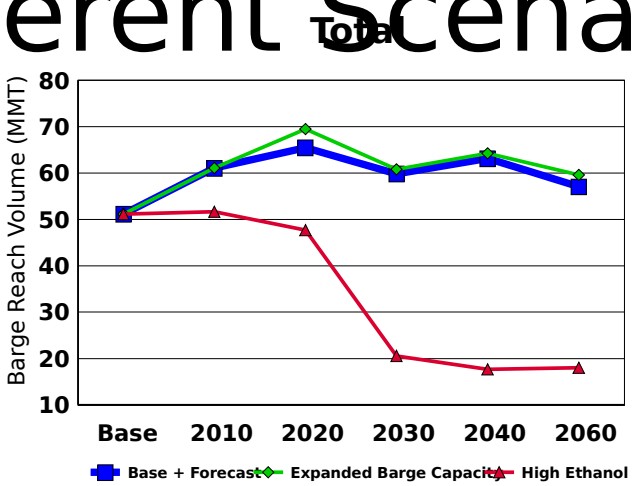
- *China as a corn exporter*: --this is the unrestricted result
  - China now competes with Europe in terms of exporting corn.
    - largely taken away from exports from Europe which increase now from 19 to 30 mmt in 2030 vs. the base case of 19 to 59 mmt.
  - US exports
    - Most of the change is in exports from the US Gulf which decline from 65 mmt in the base case to 52 mmt in 2030.
- *China imports corn*:
  - 5 mmt of corn.
  - Results depend on the ethanol assumption
    - Under base case ethanol scenario, shipments on the barge system increase slightly.
    - Under a high-ethanol assumption, the barge shipments decline

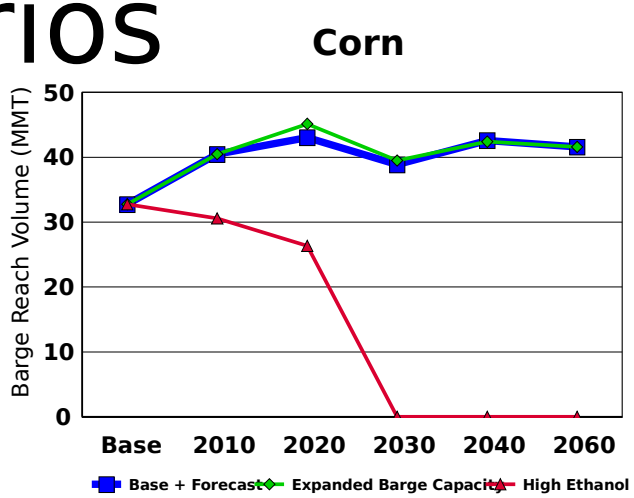
Sensitivity of Barge Reach Volumes in 2010 to China Corn Imports

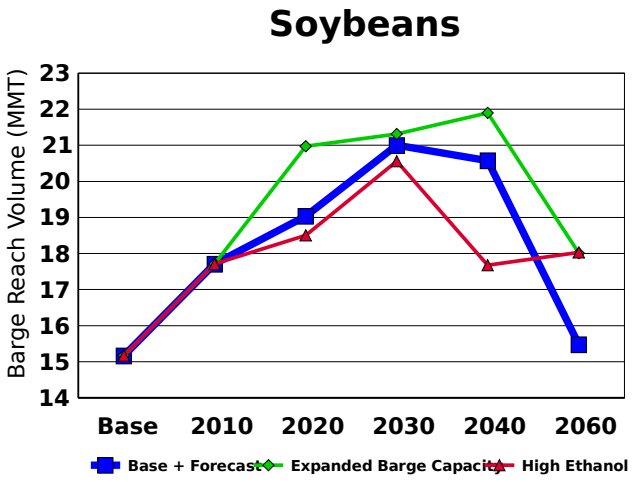


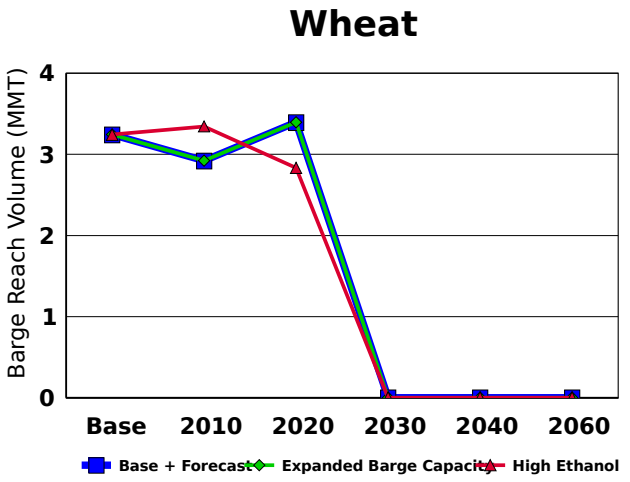
Summary of Major Trade/Policy Scenarios

Barge Reach Volumes: Under Different Scenarios

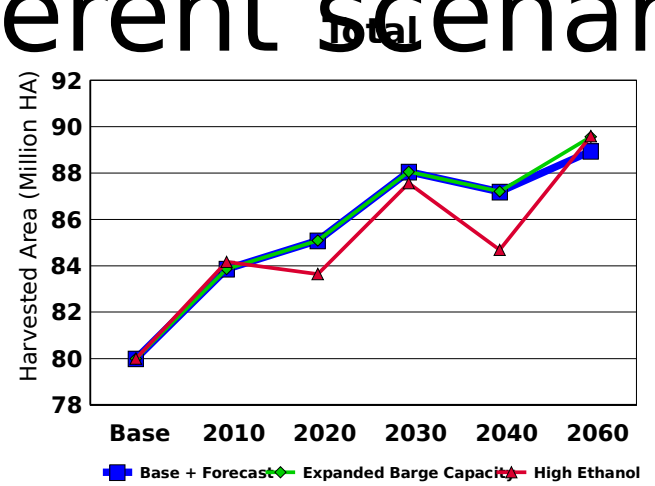


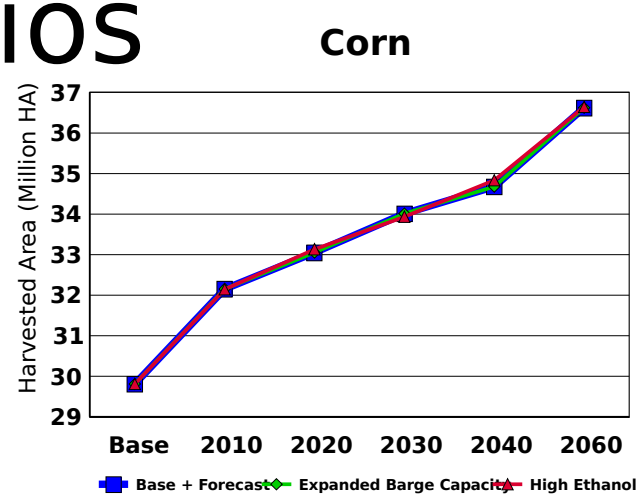


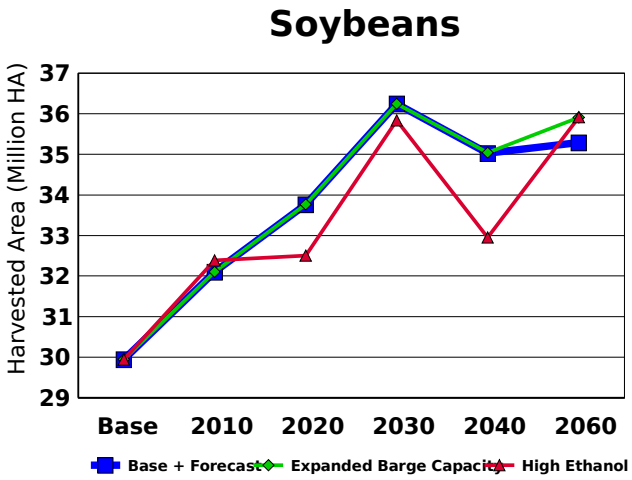


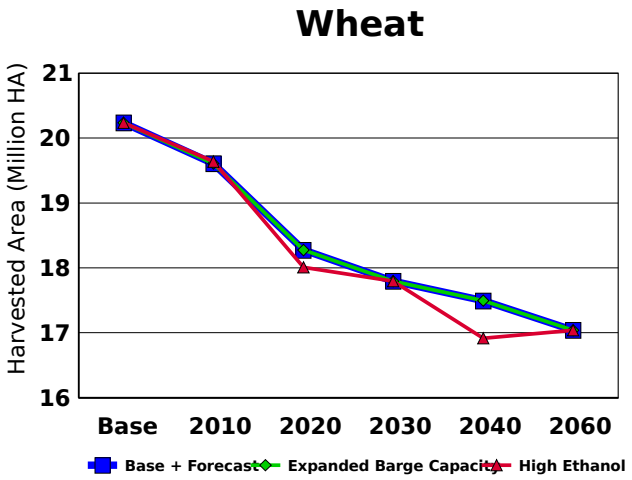


US Harvested Area: Under different scenarios









Sensitivities: Items of interest

- CRP
- Trade policies
- Brazil: productivity and transport costs
- Logistical
  - Barge demand functions
  - Rail Capacity
  - PNW rate spreads
  - Panama Canal

Conservation Reserve Program

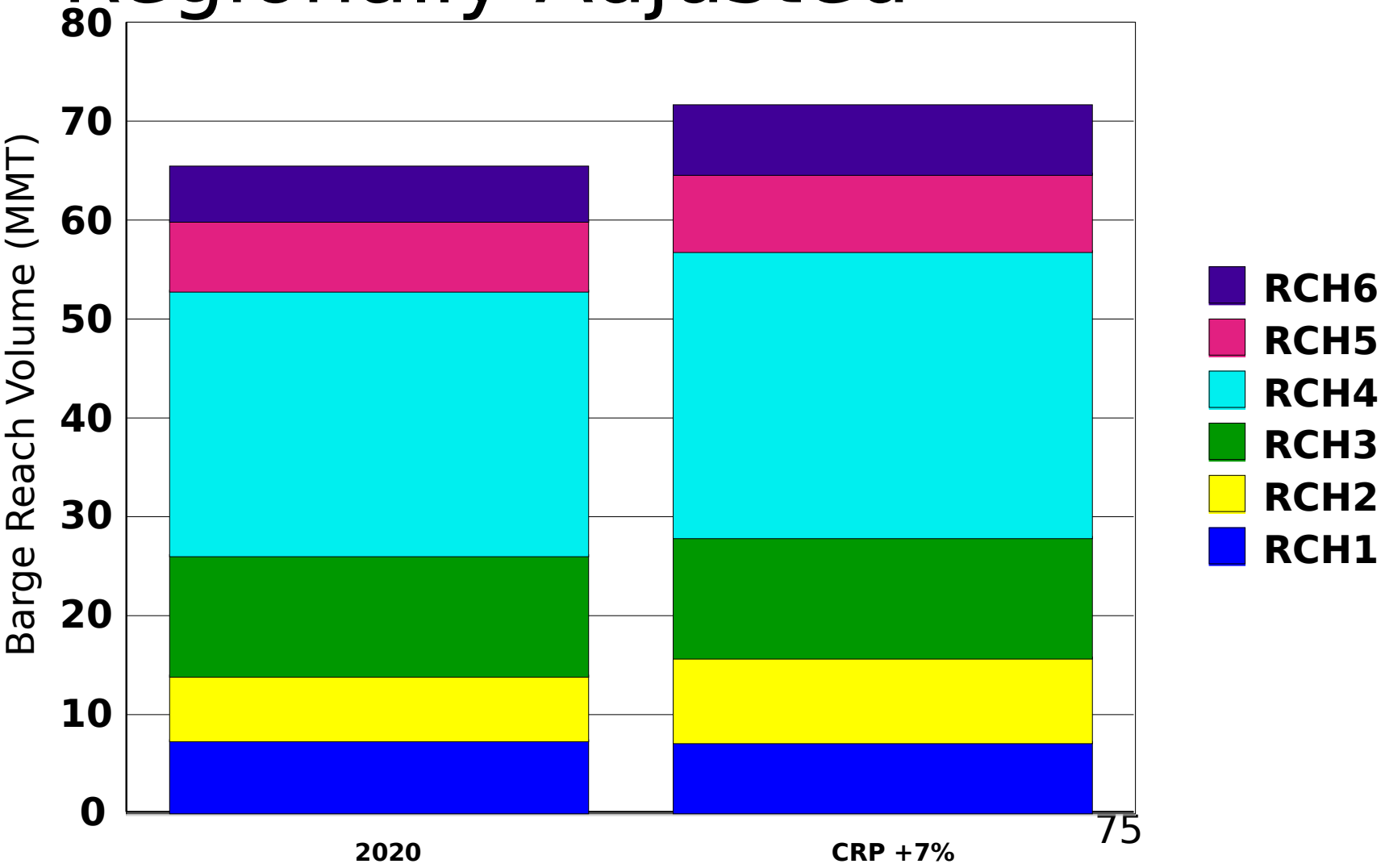
- **2007 expiring CRP acres for specific crops and model base area**
- 2007 CRP %
-
- Corn 1.9 0.03
- Soybeans 2.6 0.04
- Wheat 9.3 0.19
- Total 13.8 0.07
- * CRP area adopted from Hart (2006).

- Values
  - 7 percent of the land in the model's base period
- Model
  - base case projections implies a return of these acres to production.
    - if these were not, the implication would basically result in competitor countries expanding their area and barge demand decreases.
  - used to evaluate these impacts
  - If not: Results suggest barge demand -10 mmt in 2010.

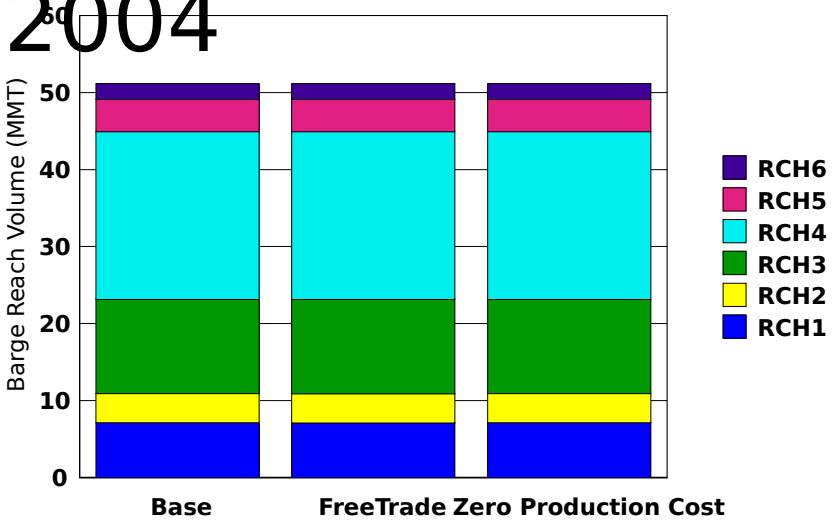
CRP Assumptions

- The model was run for 2020 assuming an additional 7% increase in area available for planting
  - Max area available for planting
  - 7% was allocated based on the distribution of CRP acres by production region
  - Model chooses which crops are produced with this land.
  - amount shipped by barge would increase by about 5 mmt.
  - Most of the increase would be in Reaches 2, 4, 5 and 6.

Effect of CRP Increase by 7% Regionally Adjusted

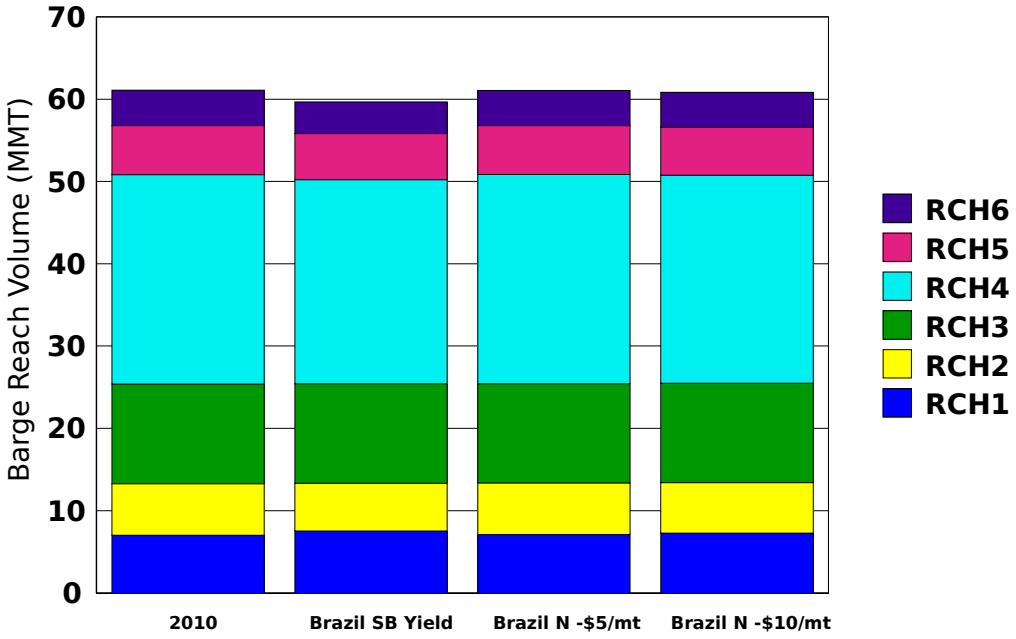


Sensitivity of Barge Reach Volume, Free Trade and Zero Production Costs, 2004



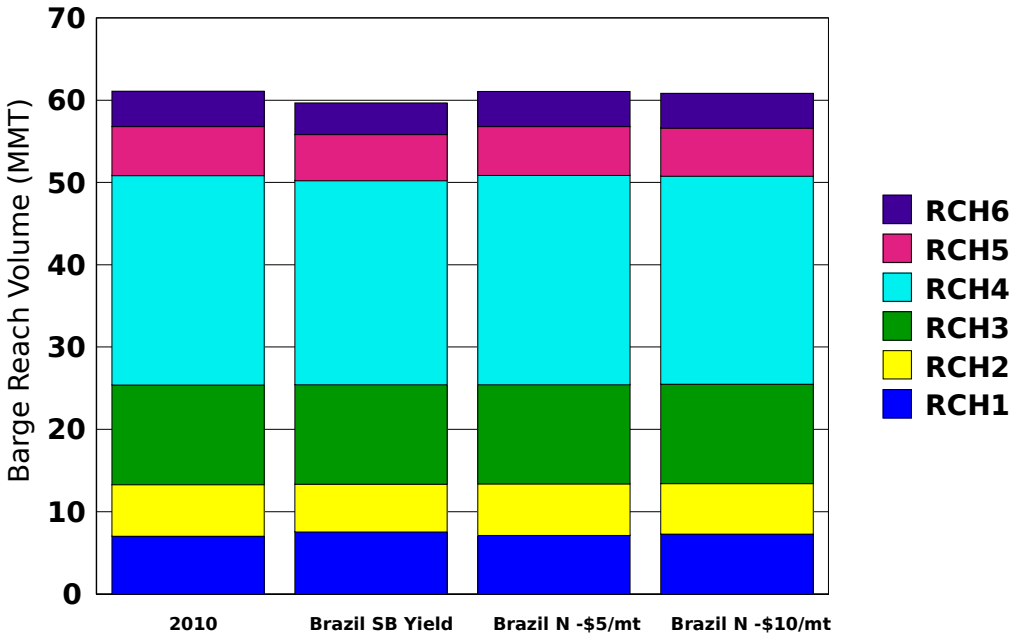
- Each subsidy and tariff was nil commencing in 2010
  - Under free trade with no subsidies, barge shipments would increase but only slightly.
  - Shipments from Reaches 1, 2 and 3 would be unchanged, and those from Reach 4 increases
- Assume nil production costs
  - results are a model in which trade flows are determined nearly completely by shipping costs.
- Results
  - minor impact of production costs
  - only change is slight reduction in Reach 3 shipments.
  - Production costs while important, are not overly critical in terms of barge demand.

Brazil: Soybean Yields



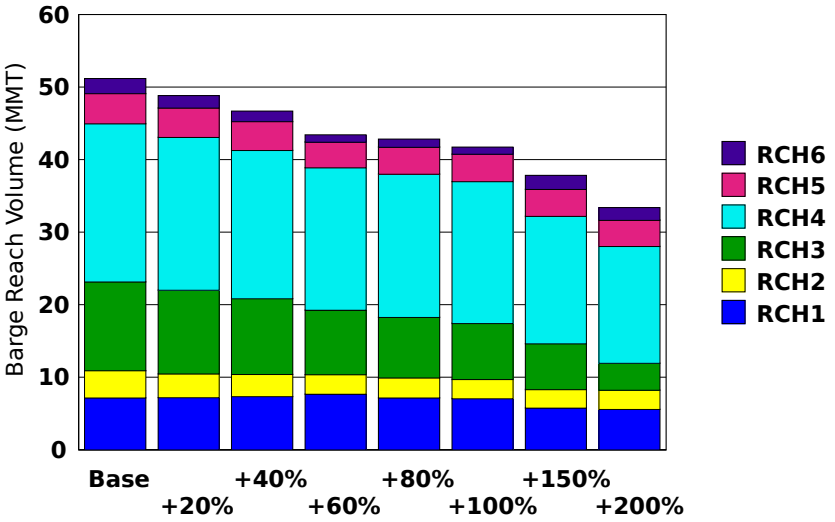
- Yields in Brazil and Argentina
  - were increased to average 3.03 (increased to equal US values)
  - reduces costs per mt and increases production
- Results indicate that
  - Brazil production increases from 58 mmt to 61
  - Reach shipments decrease
    - the change in not radical.
    - due to that the United States is lower cost producer and expands production subject to its limits.

Brazil: Shipping Costs



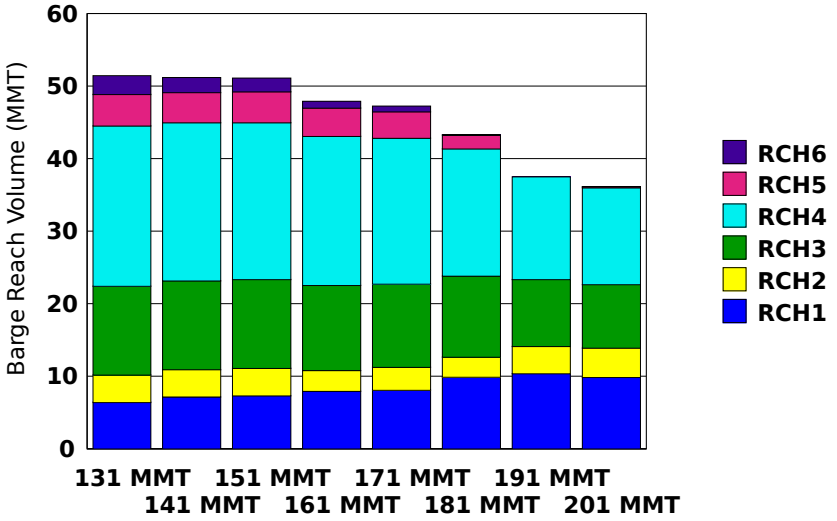
- BR 163 was recently approved for development.
  - It is unclear exactly how much these projects would impact interior shipping costs, nor the timing of them.
- Ran the model in 2010 assuming reduced shipping costs from Brazil North by $5 and $10/mt.
- Decreasing internal shipping rates in Brazil North would
  - a very slight increase in exports via barges
  - Counter-intuitive
    - Production in Brazil North is unchanged.
    - Exports from Brazil to China and North Africa increase and those to Japan decrease
    - Exports from the United States to China are reduced and exports to Japan increase.
    - Cumulative impacts of these are for a slight increase through the US Gulf.
    - Offset by a very slight reduction (2000 mt) of soybeans from the PNW.

Longer-term Demand Elasticity for Barge Shipments



- Derived arc elasticities for the total system are
  - The derived arc elasticities for the total system are -.23 and -.22 for 20% and 40% increases in barge rates.
- Elasticities vary by reach. For a 20% increase in rates, elasticities for shipments on Reach 2, 3, and 4 are -0.67, -0.28 and -0.16 respectively.
- Substantial inter-Reach substitution as barge rates change.

Barge Reach Volumes and US Rail Capacity, 2004



- Assuming rail capacity (measured as loadings) at the equivalent of 131 mmt up to 201 mmt
- Increases in rail capacity
  - inverse impact on barge shipments.
  - barge demand increases substantially as rail capacity is reduced.
  - Increases in rail capacity, holding rates and everything else constant, reduce equilibrium barge shipments.

Ocean Rates: Japan to U.S.

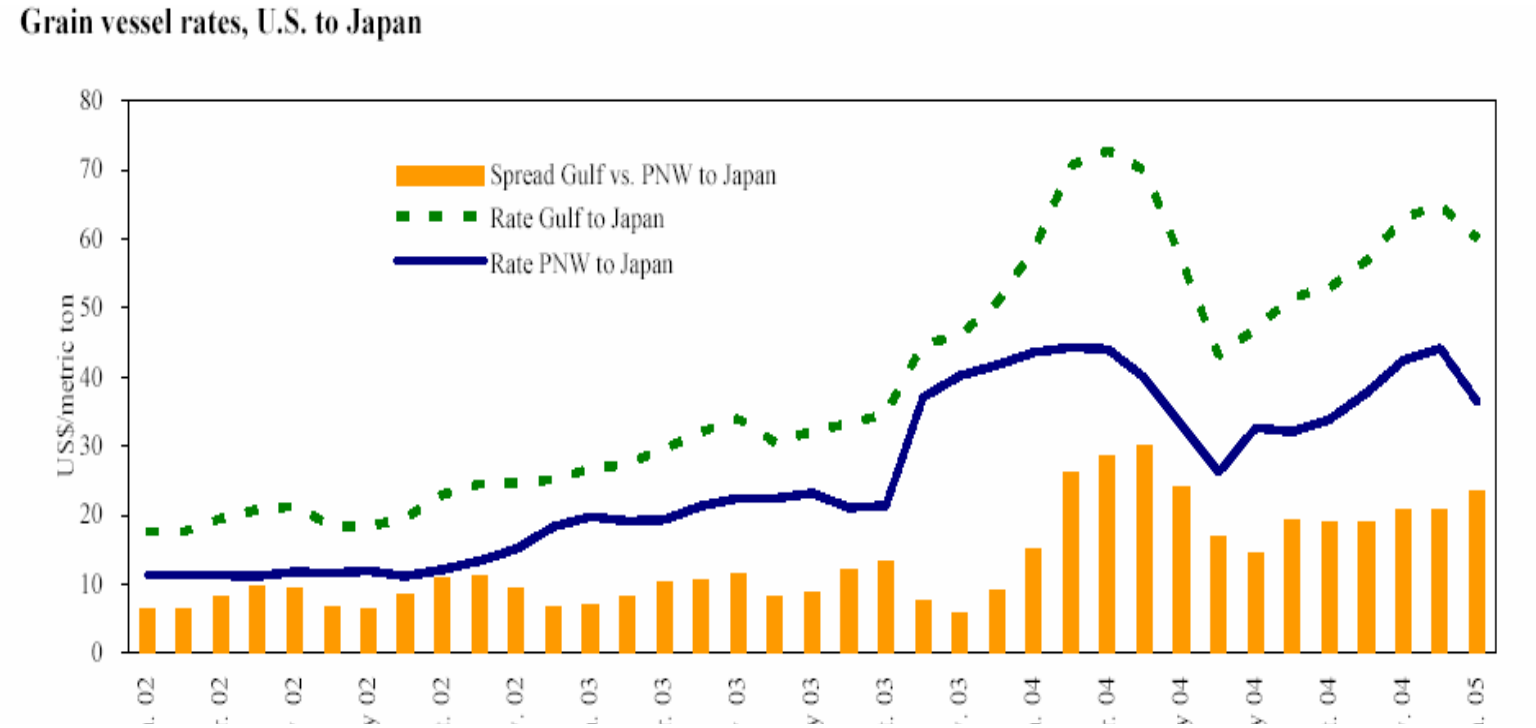
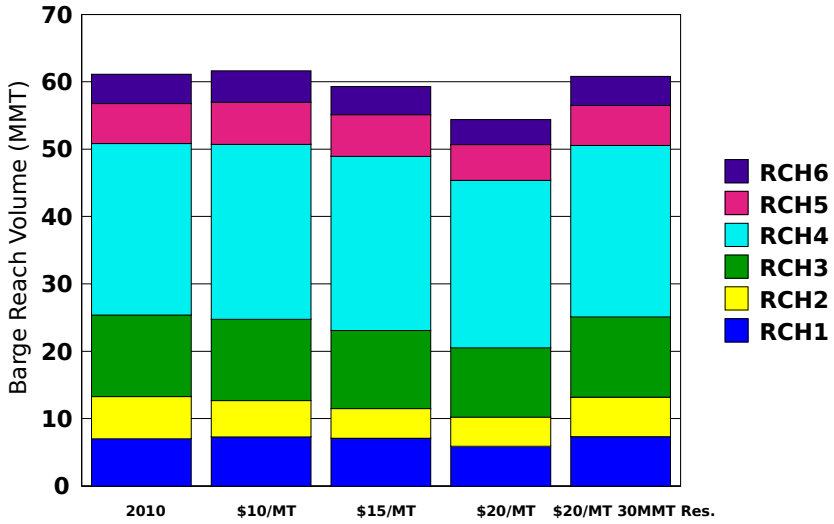


Figure 5.5 Grain Vessel Rates, U.S. To Japan.

Sensitivity of Barge Reach Volumes to Changes in US Gulf PNW Spread, 2004

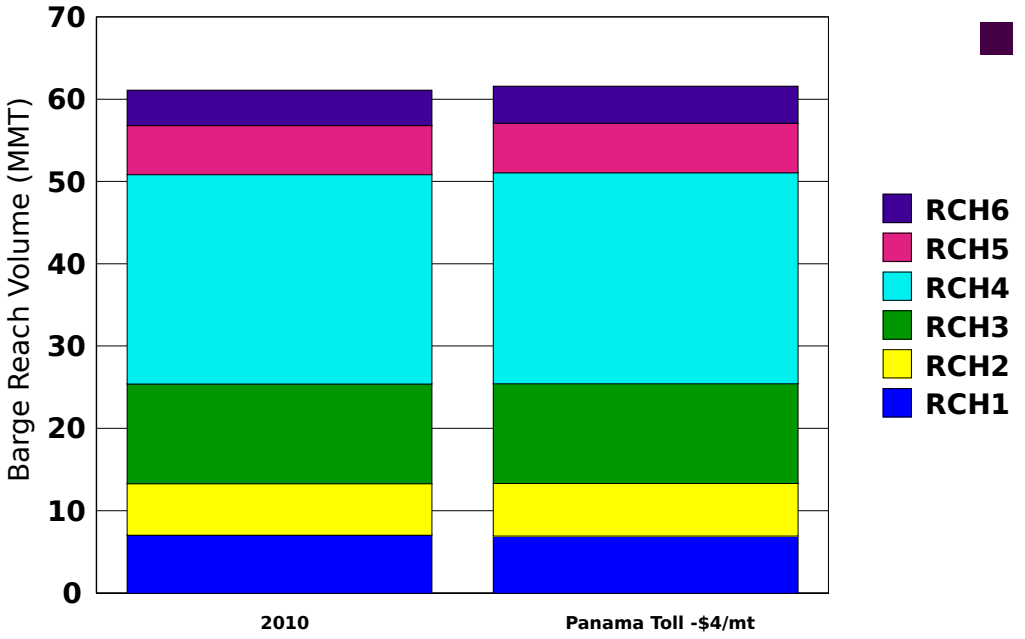


- Base case: 5$/mt (current=8.41)
- Results
  - Differential has a drastic impact on the level and composition of barge shipments
  - The biggest reductions are for shipments from Reach 2 and 3.
- Reduction in barge shipments is absorbed in part by increased shipments through the PNW.
  - Handling capacity which in recent years appears to be about 30-40 mmt.
  - With unrestricted PNW handling capacity, PNW exports increase to 55 mmt at a $20/mt differential
  - If capacity at the PNW were restricted to 30 mmt with a $20/mt differential, PNW shipments are 30 mmt and those on barges is just over 61 mmt

Panama Canal

- Proposing to be expanded and the decision is expected to be made in late 2006 following a referendum.
- Impacts are highly speculative since it is yet unknown if and how tolls would change, and if and how larger ships would impact the grain trade.
- 3 important impacts of the Panama Canal expansion
  - an increase in tolls by $1/mt for construction period (expected to be about 10 years).1
  - allow for Panamax vessels to be more fully loaded out of the US Gulf (comparable to the PNW). The impact of this is to increase the volume in a ship by about 6000 mt beginning in year 10 which would reduce shipping cost by about $4/mt net of the toll impact.2
  - Adoption of larger vessels. This impact is highly speculative and would otherwise impact all ports and thus, was not included in the sensitivity.
- To explore these prospective issues, the model imposed the above on the ocean shipping relationships.
  - Specifically, ocean shipping costs through he Canal were reduced by 4 $/mt.

Panama Canal: Results



- Result
  - increase shipment through the Reaches.
  - Most of the increase would be from Reach 4

Summary of Impacts

	Base Period	2010	2020	Beyond
Base case shipments	51.2	61.1	65.5	Decline moderately
CRP not returned by 2010 (7% of area)			71.6	Decline more
Expanded capacity		61.1	69.5	Does not impact till 2020, then allows 1-4 mmt more than current capacity
High ethanol		51.7	47.7	Decline sharply
High Ethanol: Stylized assumptions			70.5	
China imports=5 mmt base ethanol high ethanol		 61.2 51.6		
Brazil productivity increase		59.7		
Brazil shipping cost decrease		61.1 60.8		
Panama Canal expansion		61.6		

Summary: Major factors impacting results

- *Growth markets*: The most important and fastest growth markets, in terms of consumption are for corn and soybeans are China, North Africa, South Africa and the FSU and Middle East.
- *Corn Used in Ethanol:*
  - Corn used in ethanol production is expected to increase from four billion gallons to nearly 10 billion gallons in 2015, and then converge to about 11 billion gallons in 2020 forward.
  - More recent studies have suggested this could be greater and all point toward severely reduced exports

Summary: Major factors impacting results

- *Grain production costs*
  - There are substantial differences in production costs.
    - the US is the lowest cost producer of corn and soybeans;
    - most US regions' production costs for soybeans are less than those in Brazil, and those in Brazil South are less than those in Brazil North;
    - other countries have lower costs for producing wheat than those in the United States.
- *Intermodal competitiveness:*
  - It is critical that rail rates are less than barge shipping costs for some larger origin areas and movements.
  - In some cases the direct rail cost to the US Gulf is less than barge shipping costs.
  - Econometric analysis suggests that over time there have been productivity increases in rail, which has resulted in reduced real rail rates.

Delay Costs

- Several Reaches are near the point at which positive delay costs are accrued.
  - At higher volumes, delay costs escalate and ultimately become nearly vertical.
- Proposed improvements would have the impact of shifting the delay function rightwards meaning that near-nil delay costs exist for a broader range of shipments.
- **Results: Without the expansion in barge capacity,**
  - the delay costs in 2020 would increase on each Reach.
  - Those on Reach 4 would increase to $1.08/mt.
- Results: Expansion would
  - result in reduced delay costs on each of Reaches 1, 2 and 4 by about $0.44/mt, 1.04/mt and $1.01/mt respectively.
  - Expanding lock capacity reduces delay costs, increases capacity and shipments by barge.
  - Barge shipments increase by about +4 mmt by 2020.

Delay Costs

- Impacts of expanding locks are comprised of
  - Reduced delay costs:
    - $61 million
  - Increase in barge rates due to the increase in volume
  - decrease in rail shipping cost
  - increase in ocean shipping costs.
  - Total impact of expanding locks:
    - reduced costs by about $52 million.

Projections of Barge Shipments

- *Base case projections*:
  - US corn exports decline the most to around 42 mmt.
  - Wheat exports decline substantially
  - Soybeans increase through 2030.
- Total barge volume increases from the base period at 51 mmt to 65 mmt in 2020.
  - Thereafter, shipments decline to a longer term level at about 57 mmt.

Summary 2

- Results are highly dependent on assumptions as below, in rank order
  - Ethanol
  - Yield growth rates
  - CRP
  - Growth in non-grain shipments on the River, impacting delay costs
  - Rail capacity
  - Rail-barge substitution

Extensions: *Model Specifications*

- Given the size and complexity of this model, there obviously a number of alternative approaches.
- In rank order, those that would likely have the greatest impact on the results would be
  - elasticity of substitution amongst modes, estimate them and include in the model (data exists to do this, and would allow less extreme shifting amongst modes in response to critical variables);
  - explicit supply and demand functions for underlying commodities (but, this is not inconsequential due to the disaggregated specification of the model).

More important factors impacting results are

- Assumptions on non-grain demand on River (large impact on delay costs)
- Rail
  - Capacities
  - Rates
- Agronomics
  - Yields
  - CRP
  - Ethanol

Other Extensions

- Others features could be included into the model
  - Biodiesel: implicitly already in model
  - DDG Shipping
  - Ethanol shipping
- Comment: Unlikely to impact results
  - Highly speculative regarding numerous aspects including
    - Shipping rates
    - Equipment and practices

Appendix Tables

Base Case Projections: Exports

	Alfalfa BaseCase	F2010	F2020	F2030	F2040	F2060
ARGX	28,962	24,197	33,799	50,572	44,026	59,835
AUSX	19,817	22,376	28,701	39,964	33,575	46,568
BRZ1X	11,147	10,385	9,947	9,308	11,337	9,715
BRZ2X	9,904	9,400	16,854	21,965	35,642	91,344
CANEX	512	512	512	1,003	983	888
CANWX	11,912	12,652	11,775	14,166	16,527	19,381
CHIX	8,000	0	0	0	0	0
EURX	44,631	59,570	77,081	108,641	139,491	222,787
LATX	3,696	4,641	4,022	7,608	5,184	5,371
MEXX	0	0	0	0	0	2,861
SAX	24,721	17,025	22,138	25,790	28,553	26,409
USEX	2,554	2,580	2,613	2,147	2,147	4,315
USGX	65,215	91,864	75,889	62,214	63,176	57,078
USPNWX	24,594	18,178	22,639	16,388	16,242	9,292
US Mex Dir	8,234	9,097	9,915	11,074	9,442	5,000
Grand Total	263,899	282,477	317,886	370,838	406,325	560,845
Total US	100,597	121,719	111,056	91,823	91,008	75,686

	corn BaseCase	F2010	F2020	F2030	F2040	F2060
ARGX	11,122	10,172	16,060	21,033	22,818	29,934
AUSX	17	0	131	270	360	706
BRZ1X	0	0	0	0	0	0
BRZ2X	1,432	1,675	1,460	3,822	3,589	3,886
CANEX	0	0	0	0	0	0
CANWX	0	0	0	0	0	0
CHIX	8,000	0	0	0	0	0
EURX	19,000	21,322	36,027	56,105	64,649	101,696
LATX	0	0	0	0	0	0
MEXX	0	0	0	0	0	2,861
SAX	0	0	1,624	5,217	6,793	9,851
USEX	0	0	0	0	0	0
USGX	32,767	53,160	48,485	38,863	42,600	41,606
USPNWX	9,923	8,886	7,111	646	1,589	0
US Mex Dir	1,005	315	0	0	379	0
Grand Total	83,266	95,529	110,897	125,955	142,777	190,539
Total US	43,695	62,361	55,596	39,509	44,568	41,606

	soybean BaseCase	F2010	F2020	F2030	F2040	F2060
ARGX	7,997	5,914	9,710	17,644	19,318	29,901
AUSX	0	0	0	0	4	101
BRZ1X	11,147	10,385	9,947	9,308	11,337	9,715
BRZ2X	8,472	7,725	15,394	18,143	32,053	87,458
CANEX	0	0	0	0	0	0
CANWX	0	0	0	0	0	0
CHIX	0	0	0	0	0	0
EURX	0	0	0	0	0	0
LATX	3,696	4,641	4,022	7,608	5,184	5,371
MEXX	0	0	0	0	0	0
SAX	0	0	0	0	0	0
USEX	0	0	0	0	0	2,168
USGX	19,924	28,524	22,697	23,351	20,577	15,472
USPNWX	6,101	1,670	7,906	8,120	7,031	1,670
US Mex Dir	3,995	4,685	5,000	5,000	4,621	5,000
Grand Total	61,333	63,544	74,676	89,173	100,125	156,856
Total US	30,020	34,879	35,603	36,471	32,229	24,311

	wheat BaseCase	F2010	F2020	F2030	F2040	F2060
ARGX	9,842	8,112	10,029	11,895	1,890	0
AUSX	19,799	22,376	28,570	39,694	33,210	45,762
BRZ1X	0	0	0	0	0	0
BRZ2X	0	0	0	0	0	0
CANEX	512	512	512	1,003	983	888
CANWX	11,912	12,652	11,775	14,166	16,527	19,381
CHIX	0	0	0	0	0	0
EURX	25,630	38,248	41,055	52,536	74,843	121,092
LATX	0	0	0	0	0	0
MEXX	0	0	0	0	0	0
SAX	24,721	17,025	20,514	20,573	21,760	16,557
USEX	2,554	2,580	2,613	2,147	2,147	2,147
USGX	12,524	10,181	4,707	0	0	0
USPNWX	8,570	7,622	7,622	7,622	7,622	7,622
US Mex Dir	3,234	4,097	4,915	6,074	4,442	0
Grand Total	119,299	123,404	132,312	155,711	163,423	213,449
Total US	26,882	24,479	19,858	15,843	14,211	9,769

Expanded Capacity: Exports

(All) BaseCase	F2010	F2020	F2030	F2040	F2060
ARGX	28,962	24,197	35,799	50,572	44,026	59,835
AUSX	19,817	22,376	28,701	39,964	33,575	46,568
BRZ1X	11,147	10,385	9,947	9,308	11,337	9,715
BRZ2X	9,904	9,400	16,854	21,965	35,580	88,809
CANEX	512	512	512	1,003	983	888
CANWX	11,912	12,652	11,775	14,166	16,527	19,381
CHIX	8,000	0	0	0	0	0
EURX	44,631	59,570	77,081	108,641	139,491	222,787
LATX	3,696	4,641	4,022	7,608	5,184	5,371
MEXX	0	0	0	0	0	2,861
SAX	24,721	17,025	22,138	25,790	28,553	26,409
USEX	2,554	2,580	2,613	2,147	2,147	4,315
USGX	65,215	91,864	77,806	62,860	64,397	59,613
USPNWX	24,594	18,178	20,722	15,742	15,084	9,292
US Mex Dir	8,234	9,097	9,915	11,074	9,442	5,000
Grand Total	263,899	282,477	317,886	370,838	406,325	560,845
Total US	100,597	121,719	111,056	91,823	91,070	78,220

corn BaseCase	F2010	F2020	F2030	F2040	F2060
ARGX	11,122	10,172	16,060	21,033	22,818	29,934
AUSX	17	0	131	270	360	706
BRZ1X	0	0	0	0	0	0
BRZ2X	1,432	1,675	1,460	3,822	3,589	3,886
CANEX	0	0	0	0	0	0
CANWX	0	0	0	0	0	0
CHIX	8,000	0	0	0	0	0
EURX	19,000	21,322	36,027	56,105	64,649	101,696
LATX	0	0	0	0	0	0
MEXX	0	0	0	0	0	2,861
SAX	0	0	1,624	5,217	6,793	9,851
USEX	0	0	0	0	0	0
USGX	32,767	53,160	49,916	39,509	42,408	41,606
USPNWX	9,923	8,886	5,679	0	1,192	0
US Mex Dir	1,005	315	0	0	968	0
Grand Total	83,266	95,529	110,897	125,955	142,777	190,539
Total US	43,695	62,361	55,596	39,509	44,568	41,606

soybean BaseCase	F2010	F2020	F2030	F2040	F2060
ARGX	7,997	5,914	9,710	17,644	19,318	29,901
AUSX	0	0	0	0	4	101
BRZ1X	11,147	10,385	9,947	9,308	11,337	9,715
BRZ2X	8,472	7,725	15,394	18,143	31,991	84,923
CANEX	0	0	0	0	0	0
CANWX	0	0	0	0	0	0
CHIX	0	0	0	0	0	0
EURX	0	0	0	0	0	0
LATX	3,696	4,641	4,022	7,608	5,184	5,371
MEXX	0	0	0	0	0	0
SAX	0	0	0	0	0	0
USEX	0	0	0	0	0	2,168
USGX	19,924	28,524	23,183	23,351	21,989	18,007
USPNWX	6,101	1,670	7,420	8,120	6,270	1,670
US Mex Dir	3,995	4,685	5,000	5,000	4,032	5,000
Grand Total	61,333	63,544	74,676	89,173	100,125	156,856
Total US	30,020	34,879	35,603	36,471	32,290	26,846

wheat BaseCase	F2010	F2020	F2030	F2040	F2060
ARGX	9,842	8,112	10,029	11,895	1,890	0
AUSX	19,799	22,376	28,570	39,694	33,210	45,762
BRZ1X	0	0	0	0	0	0
BRZ2X	0	0	0	0	0	0
CANEX	512	512	512	1,003	983	888
CANWX	11,912	12,652	11,775	14,166	16,527	19,381
CHIX	0	0	0	0	0	0
EURX	25,630	38,248	41,055	52,536	74,843	121,092
LATX	0	0	0	0	0	0
MEXX	0	0	0	0	0	0
SAX	24,721	17,025	20,514	20,573	21,760	16,557
USEX	2,554	2,580	2,613	2,147	2,147	2,147
USGX	12,524	10,181	4,707	0	0	0
USPNWX	8,570	7,622	7,622	7,622	7,622	7,622
US Mex Dir	3,234	4,097	4,915	6,074	4,442	0
Grand Total	119,299	123,404	132,312	155,711	163,423	213,449
Total US	26,882	24,479	29,858	15,843	14,211	9,769

High Ethanol Demand: Exports

	Alfalfa BaseCase	F2010	F2020	F2030	F2040	F2060
ARGX	28,982	28,052	38,191	40,079	46,109	63,667
AUSX	19,817	23,250	32,411	45,189	33,693	46,715
BRZ1X	11,147	8,833	10,977	12,178	14,151	10,774
BRZ2X	9,904	9,906	17,921	26,541	37,141	81,258
CANEX	512	512	512	1,003	983	888
CANWX	11,912	10,698	11,935	14,379	16,415	19,381
CHIX	8,000	0	0	0	0	0
EURX	44,631	70,355	77,686	122,258	156,078	238,788
LATX	3,696	4,325	4,022	6,294	5,184	5,371
MEXX	0	0	0	2,854	5,180	9,337
SAX	24,721	10,331	23,919	26,090	28,960	23,121
USEX	2,554	2,580	2,613	2,147	2,147	5,269
USGX	65,215	79,066	50,956	23,711	19,316	18,029
USPNWX	24,594	12,279	14,560	14,966	9,292	9,292
US Mex Dir	8,234	9,097	9,915	11,074	7,510	5,000
Grand Total	263,899	269,284	295,620	348,763	382,159	536,889
Total US	100,597	103,022	78,044	51,898	38,266	37,589

	corn BaseCase	F2010	F2020	F2030	F2040	F2060
ARGX	11,122	14,027	18,453	24,294	26,791	33,767
AUSX	17	83	194	361	478	832
BRZ1X	0	0	1,030	2,870	2,814	1,058
BRZ2X	1,432	2,181	4,790	8,398	9,202	9,348
CANEX	0	0	0	0	0	0
CANWX	0	0	0	0	0	0
CHIX	8,000	0	0	0	0	0
EURX	19,000	29,209	46,005	69,722	81,235	117,696
LATX	0	0	0	0	0	0
MEXX	0	0	0	2,854	5,180	9,337
SAX	0	877	4,164	8,915	11,574	14,977
USEX	0	0	0	0	0	0
USGX	32,767	38,903	26,370	0	0	0
USPNWX	9,923	1,056	0	0	0	0
US Mex Dir	1,005	2,246	0	0	0	0
Grand Total	83,266	88,583	101,006	117,414	137,275	187,017
Total US	43,695	42,206	26,370	0	0	0

	soybean BaseCase	F2010	F2020	F2030	F2040	F2060
ARGX	7,997	5,914	9,710	11,757	19,318	29,901
AUSX	0	0	0	0	4	121
BRZ1X	11,147	8,833	9,947	9,308	11,337	9,715
BRZ2X	8,472	7,725	13,131	18,143	27,939	71,909
CANEX	0	0	0	0	0	0
CANWX	0	0	0	0	0	0
CHIX	0	0	0	0	0	0
EURX	0	0	0	0	0	0
LATX	3,696	4,325	4,022	6,294	5,184	5,371
MEXX	0	0	0	0	0	0
SAX	0	0	0	0	0	0
USEX	0	0	0	0	0	3,122
USGX	19,924	29,484	20,989	23,711	19,316	18,029
USPNWX	6,101	3,601	6,938	7,344	1,670	1,670
US Mex Dir	3,995	2,754	5,000	5,000	5,000	5,000
Grand Total	61,333	62,636	69,736	81,557	89,769	144,838
Total US	30,020	35,839	32,926	36,055	25,986	27,820

	wheat BaseCase	F2010	F2020	F2030	F2040	F2060
ARGX	9,842	8,112	10,029	4,028	0	0
AUSX	19,799	23,167	32,217	44,828	33,210	45,762
BRZ1X	0	0	0	0	0	0
BRZ2X	0	0	0	0	0	0
CANEX	512	512	512	1,003	983	888
CANWX	11,912	10,698	11,935	14,379	16,415	19,381
CHIX	0	0	0	0	0	0
EURX	25,630	41,145	31,681	52,536	74,843	121,092
LATX	0	0	0	0	0	0
MEXX	0	0	0	0	0	0
SAX	24,721	9,454	19,755	17,175	17,386	8,144
USEX	2,554	2,580	2,613	2,147	2,147	2,147
USGX	12,524	10,679	3,597	0	0	0
USPNWX	8,570	7,622	7,622	7,622	7,622	7,622
US Mex Dir	3,234	4,097	4,915	6,074	2,510	0
Grand Total	119,299	118,065	124,877	149,792	155,115	205,035
Total US	26,882	24,978	18,748	15,843	12,279	9,769

Base Case Projections: Barge Reach Volumes

Total	Base	F2010	F2020	F2030	F2040	F2060
RCH1	7,154	7,057	7,314	7,192	7,412	1,143
RCH2	3,781	6,273	6,541	5,797	6,087	8,804
RCH3	12,235	12,091	12,235	11,287	11,931	12,235
RCH4	21,771	25,466	26,932	25,988	26,725	24,953
RCH5	4,184	5,938	7,013	6,112	6,742	5,285
RCH6	2,050	4,288	5,461	3,489	4,281	4,659
Total	51,175	61,114	65,496	59,865	63,176	57,078

corn	Base	F2010	F2020	F2030	F2040	F2060
RCH1	2,834	2,874	3,340	3,814	4,254	830
RCH2	3,781	5,018	4,743	3,368	3,890	5,442
RCH3	8,657	9,974	9,830	8,618	9,035	9,419
RCH4	14,463	17,149	18,473	17,150	18,484	19,183
RCH5	2,625	4,173	4,965	4,307	4,912	4,661
RCH6	408	1,294	1,709	1,606	2,024	2,071
Total	32,767	40,482	43,061	38,863	42,600	41,606

soybean	Base	F2010	F2020	F2030	F2040	F2060
RCH1	2,556	3,222	3,007	3,378	3,158	312
RCH2	0	1,255	1,797	2,429	2,196	3,362
RCH3	3,578	2,117	2,405	2,669	2,896	2,816
RCH4	6,945	8,052	8,122	8,837	8,240	5,770
RCH5	1,283	1,543	1,771	1,805	1,829	624
RCH6	804	1,521	1,937	1,884	2,257	2,587
Total	15,166	17,709	19,039	21,002	20,577	15,472

wheat	Base	F2010	F2020	F2030	F2040	F2060
RCH1	1,764	962	967	0	0	0
RCH2	0	0	0	0	0	0
RCH3	0	0	0	0	0	0
RCH4	364	265	337	0	0	0
RCH5	276	221	276	0	0	0
RCH6	838	1,473	1,816	0	0	0
Total	3,242	2,922	3,396	0	0	0

Expanded Capacity: Barge Reach Volumes

	Total Base	F2010	FExp2020	FExp2030	FExp2040	FExp2060
RCH1	7,154	7,057	9,332	6,332	6,849	0
RCH2	3,781	6,273	8,185	6,958	7,426	11,991
RCH3	12,235	12,091	12,235	11,714	12,235	12,235
RCH4	21,771	25,466	30,079	28,406	29,811	27,514
RCH5	4,184	5,938	5,797	4,129	4,537	3,708
RCH6	2,050	4,288	3,896	3,282	3,449	4,165
Total	51,175	61,114	69,523	60,821	64,308	59,613

	corn Base	F2010	FExp2020	FExp2030	FExp2040	FExp2060
RCH1	2,834	2,874	4,139	3,814	4,254	0
RCH2	3,781	5,018	5,432	3,894	4,579	6,766
RCH3	8,657	9,974	9,830	9,046	9,339	9,419
RCH4	14,463	17,149	20,559	18,187	19,112	20,136
RCH5	2,625	4,173	3,986	3,170	3,535	3,708
RCH6	408	1,294	1,208	1,398	1,590	1,578
Total	32,767	40,482	45,154	39,509	42,408	41,606

	soybean Base	F2010	FExp2020	FExp2030	FExp2040	FExp2060
RCH1	2,556	3,222	3,661	2,518	2,595	0
RCH2	0	1,255	2,753	3,064	2,847	5,225
RCH3	3,578	2,117	2,405	2,669	2,896	2,816
RCH4	6,945	8,052	9,183	10,219	10,700	7,378
RCH5	1,283	1,543	1,536	959	1,003	0
RCH6	804	1,521	1,437	1,884	1,859	2,587
Total	15,166	17,709	20,974	21,313	21,900	18,007

	wheat Base	F2010	FExp2020	FExp2030	FExp2040	FExp2060
RCH1	1,764	962	1,532	0	0	0
RCH2	0	0	0	0	0	0
RCH3	0	0	0	0	0	0
RCH4	364	265	337	0	0	0
RCH5	276	221	276	0	0	0
RCH6	838	1,473	1,250	0	0	0
Total	3,242	2,922	3,396	0	0	0

High Ethanol Demand: Barge Reach Volumes

Total	Base	HE2010	HE2020	HE2030	HE2040	HE2060
RCH1	7,154	9,420	8,400	2,626	2,088	0
RCH2	3,781	3,520	2,233	2,564	0	5,225
RCH3	12,235	8,866	8,421	2,663	2,393	2,816
RCH4	21,771	22,976	22,529	10,196	11,176	7,400
RCH5	4,184	4,629	4,193	1,102	837	0
RCH6	2,050	2,257	1,933	1,408	1,181	2,587
Total	51,175	51,668	47,709	20,560	17,676	18,029

corn	Base	HE2010	HE2020	HE2030	HE2040	HE2060
RCH1	2,834	3,663	3,349	0	0	0
RCH2	3,781	2,368	1,377	0	0	0
RCH3	8,657	6,708	6,011	0	0	0
RCH4	14,463	14,461	12,984	0	0	0
RCH5	2,625	2,824	2,299	0	0	0
RCH6	408	590	351	0	0	0
Total	32,767	30,615	26,370	0	0	0

soybean	Base	HE2010	HE2020	HE2030	HE2040	HE2060
RCH1	2,556	3,845	3,559	2,626	2,088	0
RCH2	0	1,152	856	2,564	0	5,225
RCH3	3,578	2,158	2,411	2,663	2,393	2,816
RCH4	6,945	8,193	9,206	10,196	11,176	7,400
RCH5	1,283	1,543	1,618	1,102	837	0
RCH6	804	819	854	1,408	1,181	2,587
Total	15,166	17,709	18,504	20,560	17,676	18,029

wheat	Base	HE2010	HE2020	HE2030	HE2040	HE2060
RCH1	1,764	1,912	1,493	0	0	0
RCH2	0	0	0	0	0	0
RCH3	0	0	0	0	0	0
RCH4	364	322	338	0	0	0
RCH5	276	262	277	0	0	0
RCH6	838	848	727	0	0	0
Total	3,242	3,345	2,835	0	0	0

Current Capacity: Harvested Area

Harvested Area (000 HA)

Total	Base	2010	2020	2030	2040	2060
ARG	22,887	20,357	21,930	24,754	24,344	26,752
AUS	13,894	14,044	14,729	16,988	13,050	13,985
BRZ N	20,787	19,932	22,232	23,990	26,248	36,713
BRZ S	16,977	16,368	15,785	16,553	16,531	17,270
CAL	2,828	2,785	2,285	2,258	2,230	2,174
CBC	35	34	28	28	27	27
CHI	61,507	59,210	57,942	56,711	57,733	61,727
CMB	1,636	1,354	1,341	1,339	1,322	1,286
CON	2,550	2,665	2,813	3,264	3,212	3,702
CSK	6,049	5,956	4,884	4,823	4,763	4,641
EUR	40,018	39,672	36,927	36,759	36,127	36,742
FSU-ME	71,417	70,483	70,611	76,865	71,765	66,892
JAP	376	305	280	256	231	182
KOR	104	111	116	133	133	149
LAT	8,397	8,185	8,754	11,063	10,020	11,523
MEX	8,253	7,364	9,163	10,498	10,659	12,143
NAF	8,923	9,107	9,732	11,424	11,620	13,668
SA	56,452	54,321	56,650	63,525	67,394	78,798
SAF	26,824	25,616	29,644	35,120	36,479	44,216
SEA	9,990	9,874	9,676	10,448	9,806	9,853
USCP	7,654	8,406	7,595	7,623	7,619	7,709
USCPR	4,976	4,961	5,203	5,409	5,566	5,390
USD	3,180	3,472	3,170	3,843	3,441	3,720
USIAR	2,507	2,900	3,047	3,173	3,271	3,244
USIAW	6,632	7,655	8,053	8,396	8,664	8,539
USILN	5,221	5,999	6,298	6,554	6,752	6,695
USILS	3,848	4,336	4,550	4,733	4,874	4,765
USINN	3,666	4,263	4,482	4,670	4,816	5,195
USINR	986	1,097	1,151	1,197	1,233	1,278
USMI	1,838	2,142	2,238	2,318	2,377	2,324
USMN	3,447	2,556	2,644	2,713	2,570	2,685
USMNR	2,921	1,997	2,089	2,172	2,235	2,234
USMOR	816	928	976	1,018	1,051	1,011
USMOW	2,734	3,097	3,255	3,391	3,130	3,357
USNE	1,634	1,838	1,917	1,982	1,896	2,012
USNP	9,540	9,863	10,039	10,227	9,662	9,953
USOH	3,409	3,962	4,157	4,322	4,021	4,300
USPNW	1,874	1,643	1,608	1,573	1,537	1,467
USSE	4,421	4,854	5,079	5,269	4,902	5,218
USSP	4,453	4,320	3,950	3,924	4,073	4,369
USW	345	371	370	328	312	350
USWIS	1,278	954	994	1,027	1,051	1,057
USWIW	495	355	371	384	374	399
USWNP	2,118	1,897	1,853	1,809	1,765	1,677
Total	459,895	451,608	460,612	494,855	490,887	531,392
Total US	79,992	83,864	85,091	88,056	87,194	88,948

Harvested Area (000 HA)

Corn	Base	2010	2020	2030	2040	2060
ARG	2,434	2,134	2,577	2,846	2,731	2,880
AUS	80	74	93	109	110	130
BRZ N	7,707	7,691	7,658	8,480	8,160	8,652
BRZ S	5,385	5,358	5,303	5,837	5,582	5,844
CAL	7	8	8	9	9	9
CBC	0	0	0	0	0	0
CHI	28,350	25,431	24,247	25,605	26,963	29,680
CMB	87	88	90	103	103	98
CON	1,117	1,134	1,168	1,336	1,327	1,496
CSK	0	0	0	0	0	0
EUR	11,381	11,086	11,939	13,190	12,662	13,362
FSU-ME	4,915	5,041	5,294	6,169	6,233	7,248
JAP	1	1	1	1	1	0
KOR	18	19	22	27	29	37
LAT	5,026	4,540	5,387	6,512	6,210	7,606
MEX	7,548	6,780	8,580	9,915	9,942	11,404
NAF	1,108	1,090	1,053	1,130	1,052	1,041
SA	9,238	9,188	9,844	11,398	11,450	13,176
SAF	24,034	22,556	25,876	30,272	31,009	36,897
SEA	8,261	8,018	7,532	7,836	7,050	6,423
USCP	2,533	2,396	2,463	2,535	2,584	2,729
USCPR	2,273	1,947	2,001	2,059	2,099	2,217
USD	468	552	568	584	596	629
USIAR	1,455	1,701	1,748	1,799	1,834	1,937
USIAW	3,566	4,165	4,281	4,406	4,491	4,743
USILN	2,945	3,484	3,581	3,686	3,757	3,968
USILS	1,751	2,038	2,095	2,156	2,198	2,321
USINN	1,776	2,135	2,195	2,259	2,303	2,432
USINR	463	525	540	556	567	598
USMI	777	953	979	1,008	1,028	1,085
USMN	1,231	941	968	996	1,015	1,072
USMNR	1,623	1,245	1,280	1,317	1,343	1,418
USMOR	284	336	345	355	362	382
USMOW	882	1,045	1,074	1,105	1,127	1,190
USNE	874	992	1,019	1,049	1,069	1,129
USNP	2,146	2,469	2,538	2,612	2,663	2,812
USOH	1,259	1,505	1,547	1,592	1,623	1,714
USPNW	84	83	86	88	90	95
USSE	1,481	1,705	1,752	1,803	1,838	1,941
USSP	785	955	981	1,010	1,029	1,087
USW	77	81	83	86	87	92
USWIS	731	615	632	651	664	701
USWIW	322	255	262	269	275	290
USWNP	26	32	32	33	34	36
Total	146,507	142,393	149,722	160,788	165,298	182,603
Total US	29,810	32,156	33,052	34,013	34,675	36,621

Current Capacity: Harvested Area

Harvested Area (000 HA)

Soybean	Base	2010	2020	2030	2040	2060
ARG	14,534	13,335	14,426	16,942	16,608	18,790
AUS	35	36	37	36	34	52
BRZ N	11,587	11,020	13,366	14,314	16,905	26,903
BRZ S	10,367	9,728	9,334	9,475	9,616	9,905
CAL	0	0	0	0	0	0
CBC	0	0	0	0	0	0
CHI	9,501	10,524	11,239	13,296	13,618	16,210
CMB	0	0	0	0	0	0
CON	1,129	1,229	1,347	1,600	1,646	1,973
CSK	0	0	0	0	0	0
EUR	692	708	740	858	864	998
FSU-ME	1,032	858	1,066	1,210	1,194	1,328
JAP	146	127	123	120	116	109
KOR	83	89	90	102	99	108
LAT	2,319	2,596	2,323	3,397	2,700	3,077
MEX	76	78	100	122	144	188
NAF	14	16	20	27	31	42
SA	6,108	7,360	9,165	12,201	13,731	18,836
SAF	710	733	951	1,168	1,386	1,821
SEA	1,632	1,776	2,065	2,533	2,676	3,351
USCP	821	951	1,008	1,066	1,115	1,232
USCPR	2,200	2,580	2,733	2,891	3,023	2,750
USD	2,340	2,623	2,313	2,975	2,572	2,830
USIAR	1,047	1,196	1,295	1,370	1,433	1,303
USIAW	3,062	3,487	3,769	3,987	4,169	3,792
USILN	2,191	2,455	2,646	2,800	2,928	2,663
USILS	1,817	2,081	2,204	2,332	2,439	2,218
USINN	1,785	2,040	2,183	2,310	2,415	2,670
USINR	450	516	547	578	605	621
USMI	802	919	995	1,053	1,101	1,001
USMN	1,581	924	979	1,036	895	985
USMNR	1,273	730	788	834	872	793
USMOR	463	541	573	606	634	576
USMOW	1,546	1,807	1,914	2,025	1,750	1,926
USNE	575	643	699	740	639	704
USNP	3,113	3,418	3,620	3,829	3,310	3,642
USOH	1,790	2,106	2,231	2,360	2,040	2,245
USPNW	0	0	0	0	0	0
USSE	2,234	2,459	2,653	2,807	2,426	2,670
USSP	227	259	226	238	251	276
USW	0	0	0	0	0	0
USWIS	459	268	284	300	314	286
USWIW	169	96	105	111	96	105
USWNP	0	0	0	0	0	0
Total	89,908	92,312	100,157	113,648	116,393	138,980
Total US	29,943	32,099	33,764	36,248	35,026	35,289

Harvested Area (000 HA)

Wheat	Base	2010	2020	2030	2040	2060
ARG	5,920	4,888	4,927	4,966	5,004	5,082
AUS	13,779	13,933	14,598	16,843	12,905	13,803
BRZ N	1,493	1,221	1,209	1,196	1,184	1,159
BRZ S	1,225	1,282	1,147	1,241	1,334	1,520
CAL	2,821	2,777	2,278	2,249	2,221	2,165
CBC	35	34	28	28	27	27
CHI	23,656	23,256	22,456	17,810	17,152	15,837
CMB	1,549	1,266	1,251	1,235	1,220	1,189
CON	304	302	298	328	239	233
CSK	6,049	5,956	4,884	4,823	4,763	4,641
EUR	27,945	27,879	24,248	22,710	22,601	22,383
FSU-ME	65,470	64,584	64,252	69,486	64,338	58,316
JAP	228	177	157	136	115	73
KOR	3	3	3	4	4	4
LAT	1,052	1,049	1,044	1,154	1,109	840
MEX	628	506	483	461	574	551
NAF	7,801	8,001	8,659	10,267	10,537	12,586
SA	41,106	37,773	37,640	39,927	42,213	46,786
SAF	2,081	2,326	2,818	3,680	4,084	5,498
SEA	97	79	79	79	79	79
USCP	4,300	5,059	4,124	4,023	3,921	3,748
USCPR	503	434	469	458	444	423
USD	373	297	290	283	274	261
USIAR	5	4	4	4	4	4
USIAW	4	3	4	4	3	3
USILN	85	59	71	69	67	64
USILS	279	216	251	245	238	226
USINN	105	88	104	101	98	94
USINR	73	56	65	63	61	58
USMI	259	270	263	257	249	237
USMN	635	691	697	682	660	628
USMNR	25	21	21	20	20	23
USMOR	69	51	59	57	55	53
USMOW	307	245	267	261	253	241
USNE	185	203	198	194	188	179
USNP	4,281	3,977	3,881	3,785	3,690	3,498
USOH	360	351	379	370	358	341
USPNW	1,790	1,560	1,522	1,485	1,447	1,372
USSE	707	690	674	658	637	607
USSP	3,441	3,106	2,743	2,676	2,793	3,005
USW	269	290	287	243	225	258
USWIS	89	71	78	76	74	70
USWIW	5	4	5	4	4	4
USWNP	2,092	1,866	1,821	1,776	1,731	1,641
Total	223,480	216,903	210,734	216,429	209,197	209,809
Total US	20,239	19,609	18,275	17,795	17,493	17,039

High Ethanol Demand: Harvested Area

Harvested Area (000 HA)

Total	Base	HE2010	HE2020	HE2030	HE2040	HE2060
ARG	22,887	20,867	22,195	23,640	24,676	27,010
AUS	13,894	14,441	16,239	18,840	13,063	14,002
BRZ N	20,787	20,076	22,321	24,917	26,298	34,649
BRZ S	16,977	15,706	16,330	17,190	17,211	17,792
CAL	2,828	2,314	2,286	2,259	2,231	2,174
CBC	35	35	28	28	27	27
CHI	61,507	59,842	57,008	58,163	59,391	63,176
CMB	1,636	1,356	1,350	1,350	1,329	1,286
CON	2,550	2,741	3,102	3,620	3,574	4,012
CSK	6,049	5,613	4,884	4,823	4,763	4,641
EUR	40,018	41,363	36,801	38,294	37,774	38,027
FSU-ME	71,417	72,478	77,870	77,671	72,669	67,659
JAP	376	305	280	256	231	182
KOR	104	114	128	147	147	162
LAT	8,397	8,256	8,556	10,789	10,508	11,141
MEX	8,253	8,982	10,045	11,581	11,939	13,212
NAF	8,923	9,365	10,733	12,672	13,034	14,891
SA	56,452	52,384	58,604	66,103	70,459	81,661
SAF	26,824	25,659	29,934	35,522	36,977	44,707
SEA	9,990	10,134	10,663	11,581	10,990	10,727
USCP	7,654	8,483	7,604	7,615	7,636	7,706
USCPR	4,976	5,006	5,216	5,397	4,974	5,391
USD	3,180	3,503	3,173	3,807	3,445	3,721
USIAR	2,507	2,927	3,055	3,166	3,286	3,245
USIAW	6,632	7,724	8,074	8,377	8,130	8,542
USILN	5,221	6,053	6,314	6,540	6,783	7,273
USILS	3,848	4,375	4,517	4,723	4,420	4,767
USINN	3,666	4,302	4,493	4,659	4,838	5,199
USINR	986	1,107	1,154	1,195	1,130	1,326
USMI	1,838	2,161	2,243	2,313	2,192	2,325
USMN	3,447	2,579	2,474	2,707	2,460	2,687
USMNR	2,921	2,015	2,094	2,167	2,090	2,235
USMOR	816	936	968	1,016	933	1,012
USMOW	2,734	3,125	3,182	3,384	3,091	3,358
USNE	1,634	1,854	1,922	1,978	1,902	2,013
USNP	9,540	9,862	9,403	9,912	9,674	9,955
USOH	3,409	3,998	4,167	4,313	4,030	4,302
USPNW	1,874	1,643	1,608	1,573	1,538	1,467
USSE	4,421	4,899	4,493	5,257	4,799	5,220
USSP	4,453	4,024	3,953	3,922	3,893	4,372
USW	345	375	319	335	312	351
USWIS	1,278	963	997	1,025	1,000	1,057
USWIW	495	358	372	384	376	399
USWNP	2,118	1,897	1,853	1,809	1,765	1,677
Total	459,895	456,201	473,005	507,018	501,989	540,738
Total US	79,992	84,171	83,648	87,571	84,697	89,598

Harvested Area (000 HA)

Corn	Base	HE2010	HE2020	HE2030	HE2040	HE2060
ARG	2,434	2,643	2,842	3,157	3,064	3,137
AUS	80	89	102	121	124	141
BRZ N	7,707	7,835	8,445	9,406	9,153	9,425
BRZ S	5,385	5,458	5,848	6,474	6,261	6,367
CAL	7	8	9	10	10	9
CBC	0	0	0	0	0	0
CHI	28,350	25,431	24,247	25,605	26,963	29,680
CMB	87	89	100	115	109	98
CON	1,117	1,155	1,288	1,482	1,488	1,630
CSK	0	0	0	0	0	0
EUR	11,381	12,242	13,166	14,631	14,204	14,557
FSU-ME	4,915	5,135	5,838	6,843	6,992	7,897
JAP	1	1	1	1	1	0
KOR	18	19	24	30	33	40
LAT	5,026	4,709	5,082	6,458	6,564	7,224
MEX	7,548	8,398	9,462	10,998	11,152	12,424
NAF	1,108	1,110	1,161	1,253	1,180	1,134
SA	9,238	9,616	10,856	12,643	12,844	14,355
SAF	24,034	22,556	25,876	30,272	31,009	36,897
SEA	8,261	8,168	8,306	8,692	7,909	6,997
USCP	2,533	2,395	2,469	2,529	2,596	2,731
USCPR	2,273	1,946	2,006	2,055	2,109	2,219
USD	468	552	569	583	598	629
USIAR	1,455	1,700	1,753	1,795	1,842	1,938
USIAW	3,566	4,164	4,292	4,396	4,512	4,746
USILN	2,945	3,483	3,591	3,677	3,774	3,971
USILS	1,751	2,038	2,100	2,151	2,208	2,323
USINN	1,776	2,135	2,200	2,254	2,313	2,433
USINR	463	525	541	555	569	599
USMI	777	953	982	1,006	1,032	1,086
USMN	1,231	941	970	993	1,020	1,073
USMNR	1,623	1,245	1,283	1,314	1,349	1,419
USMOR	284	336	346	354	364	383
USMOW	882	1,045	1,077	1,103	1,132	1,191
USNE	874	991	1,022	1,047	1,074	1,130
USNP	2,146	2,468	2,544	2,606	2,675	2,814
USOH	1,259	1,505	1,551	1,589	1,630	1,715
USPNW	84	83	86	88	90	95
USSE	1,481	1,704	1,756	1,799	1,846	1,942
USSP	785	954	984	1,008	1,034	1,088
USW	77	81	84	86	88	92
USWIS	731	615	634	649	667	701
USWIW	322	255	262	269	276	290
USWNP	26	32	33	33	34	36
Total	146,507	146,810	155,788	172,129	173,892	188,658
Total US	29,810	32,146	33,136	33,938	34,832	36,645

High Ethanol Demand: Harvested Area

Harvested Area (000 HA)

Soybeans	Base	HE2010	HE2020	HE2030	HE2040	HE2060
ARG	14,534	13,335	14,426	15,517	16,608	18,790
AUS	35	37	37	36	34	57
BRZ N	11,587	11,020	12,667	14,314	15,961	24,065
BRZ S	10,367	9,193	9,334	9,475	9,616	9,905
CAL	0	0	0	0	0	0
CBC	0	0	0	0	0	0
CHI	9,501	10,721	12,395	14,748	15,275	17,659
CMB	0	0	0	0	0	0
CON	1,129	1,278	1,485	1,775	1,846	2,149
CSK	0	0	0	0	0	0
EUR	692	721	816	952	969	1,087
FSU-ME	1,032	1,063	1,175	1,342	1,339	1,447
JAP	146	127	123	120	116	109
KOR	83	91	100	113	111	118
LAT	2,319	2,478	2,323	3,050	2,700	3,077
MEX	76	78	100	122	144	188
NAF	14	16	22	30	34	46
SA	6,108	7,414	10,107	13,533	15,402	20,521
SAF	710	733	951	1,168	1,386	1,821
SEA	1,632	1,887	2,277	2,810	3,002	3,651
USCP	821	951	1,010	1,064	1,120	1,233
USCPR	2,200	2,579	2,740	2,884	2,498	2,750
USD	2,340	2,655	2,313	2,942	2,572	2,830
USIAR	1,047	1,222	1,298	1,367	1,439	1,303
USIAW	3,062	3,557	3,778	3,978	3,616	3,792
USILN	2,191	2,498	2,653	2,793	2,941	3,239
USILS	1,817	2,080	2,210	2,327	2,015	2,218
USINN	1,785	2,061	2,189	2,304	2,426	2,672
USINR	450	516	548	577	500	669
USMI	802	939	998	1,050	910	1,001
USMN	1,581	924	805	1,033	895	985
USMNR	1,273	744	790	832	721	793
USMOR	463	541	574	604	524	576
USMOW	1,546	1,807	1,885	2,020	1,750	1,926
USNE	575	660	701	738	639	704
USNP	3,113	3,416	2,977	3,520	3,310	3,642
USOH	1,790	2,106	2,237	2,355	2,040	2,245
USPNW	0	0	0	0	0	0
USSE	2,234	2,504	2,182	2,801	2,426	2,670
USSP	227	259	226	238	251	276
USW	0	0	0	0	0	0
USWIS	459	268	285	300	260	286
USWIW	169	99	105	110	96	105
USWNP	0	0	0	0	0	0
Total	89,908	92,577	100,843	114,946	117,493	140,605
Total US	29,943	32,385	32,503	35,840	32,948	35,915

Harvested Area (000 HA)

Wheat	Base	HE2010	HE2020	HE2030	HE2040	HE2060
ARG	5,920	4,888	4,927	4,966	5,004	5,082
AUS	13,779	14,315	16,099	18,683	12,905	13,803
BRZ N	1,493	1,221	1,209	1,196	1,184	1,159
BRZ S	1,225	1,054	1,147	1,241	1,334	1,520
CAL	2,821	2,306	2,278	2,249	2,221	2,165
CBC	35	35	28	28	27	27
CHI	23,656	23,691	20,367	17,810	17,152	15,837
CMB	1,549	1,266	1,251	1,235	1,220	1,189
CON	304	308	329	363	239	233
CSK	6,049	5,613	4,884	4,823	4,763	4,641
EUR	27,945	28,400	22,819	22,710	22,601	22,383
FSU-ME	65,470	66,280	70,857	69,486	64,338	58,316
JAP	228	177	157	136	115	73
KOR	3	3	4	5	3	4
LAT	1,052	1,069	1,151	1,280	1,244	840
MEX	628	506	483	461	643	600
NAF	7,801	8,238	9,550	11,389	11,820	13,711
SA	41,106	35,354	37,640	39,927	42,213	46,786
SAF	2,081	2,370	3,107	4,082	4,581	5,990
SEA	97	79	79	79	79	79
USCP	4,300	5,137	4,124	4,023	3,921	3,743
USCPR	503	481	470	457	367	423
USD	373	297	290	282	275	261
USIAR	5	4	4	4	4	4
USIAW	4	4	4	4	3	3
USILN	85	72	71	69	67	64
USILS	279	257	206	245	196	226
USINN	105	106	104	101	99	94
USINR	73	66	65	63	61	58
USMI	259	270	264	257	250	237
USMN	635	714	699	680	545	629
USMNR	25	26	21	20	20	23
USMOR	69	60	48	57	46	53
USMOW	307	274	220	261	209	241
USNE	185	203	199	193	189	179
USNP	4,281	3,977	3,881	3,785	3,690	3,498
USOH	360	388	380	369	360	341
USPNW	1,790	1,560	1,522	1,485	1,447	1,372
USSE	707	690	554	657	527	608
USSP	3,441	2,811	2,743	2,676	2,608	3,007
USW	269	293	236	249	224	258
USWIS	89	80	78	76	74	70
USWIW	5	5	5	4	4	4
USWNP	2,092	1,866	1,821	1,776	1,731	1,641
Total	223,480	216,813	216,374	219,946	210,604	211,475
Total US	20,239	19,639	18,009	17,793	16,916	17,038